United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with the Regents of the University of California (Agricultural Experiment Station) and the United States Department of the Interior, Bureau of Land Management

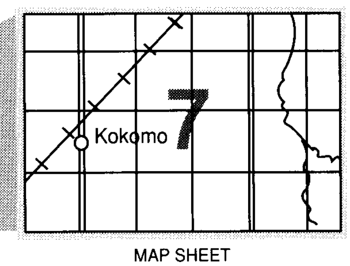
Soil Survey of Mendocino County, California, Western Part

How To Use This Soil Survey

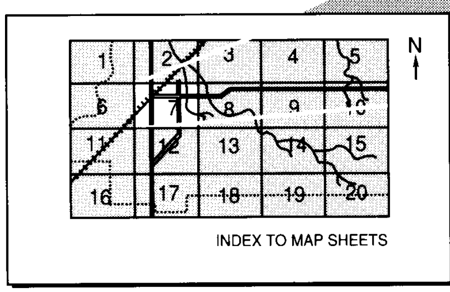
General Soil Map

The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

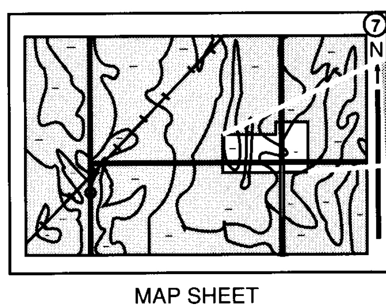


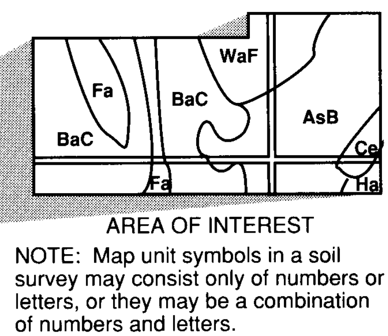
Detailed Soil Maps



The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet and turn to that sheet.





Locate your area of interest on the map sheet. Note the map units symbols that are in that area. Turn to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.

The **Contents** shows which table has data on a specific land use for each detailed soil map unit. Also see the **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1986. Soil names and descriptions were approved in 1993. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1988. This survey was made cooperatively by the Natural Resources Conservation Service, the Regents of the University of California (Agricultural Experiment Station), the Bureau of Land Management, the Georgia-Pacific Corporation, and the California Department of Forestry. It is part of the technical assistance furnished to the Mendocino County Resource Conservation District.

Cover: Overview of coastal marine terraces along Highway 1 near the town of Mendocino, California.

Additional information about the Nation's natural resources is available on the Natural Resources Conservation Service home page on the World Wide Web. The address is http://www.nrcs.usda.gov (click on "Technical Resources").

Contents

Issued 1999

Reissued 2006 (with new maps)

Foreword

This soil survey contains information that can be used in land-planning programs in the western part of Mendocino County, California. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify any special practices that may be needed. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally saturated or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or seasonally saturated soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

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Soil Survey of Mendocino County, California, Western Part

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United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with
the California Department of Forestry, Soil Vegetation Survey; Georgia-Pacific Corporation; the Regents of the University of California (Agricultural Experiment Station); and the United States Department of the Interior, Bureau of Land Management

General Nature of the Survey Area

This section provides general information about the survey area. It describes history and settlement; climate; physiography, relief, and drainage; water supply; and transportation facilities.

The survey area is on the northern coast of California (fig. 1). It is bounded on the west by the Pacific Ocean, on the north by Humboldt County, and on the south by Sonoma County. The survey area is about 1,042,400 acres, or 1,630 square miles, in size. Elevation ranges from sea level to 4,235 feet at Cahto Peak. The heavily forested northern California coastal ranges dominate the landscape (fig. 2).

The survey area has a population of about 28,500. The coastal town of Fort Bragg, the largest community, has a population of 5,675. Other important communities are Boonville, Gualala, Mendocino, and Point Arena.

Most of the survey area consists of strongly sloping to very steep hills and mountains that are used for timber and firewood production or for livestock grazing. The central and southern coastal areas are nearly level to moderately steep marine terraces that range in width from a few hundred feet near Westport and Elk to nearly 7 miles near Point Arena. Soils on the terraces are used for timber production, homesite development, livestock grazing, hay production and pasture, or recreation. Laytonville and Anderson Valleys are nearly level to moderately steep river terraces that are used for crop production, livestock grazing, or homesite development.

Previous soil surveys of the area have been published. These include a report entitled “Wildland Soils and Associated Vegetation of Mendocino County, California” (Gardner and others, 1964) and the soil survey of the Mendocino County bottom lands (Gale, 1973). The present survey updates these earlier surveys. It provides additional information and has larger maps, which show the soils in more detail.

History and Settlement

The Pomo and Yuki Indians were the earliest known inhabitants of western Mendocino County.

The first written record of the Mendocino coast appears in the log of Spanish explorer Juan Rodriguez Cabrillo. His chief pilot named Cape Mendocino for the viceroy of New Spain, Antonio de Mendoza, in 1543. Cape Mendocino is in the area that is now Humboldt County.

The first European to set foot on the Mendocino coast is not known, but German trappers are known to have made their camps along the rivers and streams.The first settler, William Kasten, was shipwrecked in 1850 and built a log cabin on the headlands north of Mendocino Bay.

Figure 1.—Location of the survey area in California.

Reports of abundant redwood forests brought Harry Meiggs from San Francisco to Mendocino Bay, where he built a sawmill in 1852. This was the first of many sawmills to be established along the Mendocino coast as the timber industry grew in response to the needs of the burgeoning San Francisco Bay area. Members of Meiggs' party, including J.B. Ford, J.E. Carlson, and W.H. Kelley, established the town of Mendocino.

In 1857, Fort Bragg was established as the main station of the Mendocino Indian Reservation. The fort, built in a pine forest near the present-day town center, was named for Colonel Braxton Bragg of Mexican War fame. Both the reservation and the fort were abandoned in 1876. The Indians were moved to Round Valley, and land became available for purchase. In 1885, the sawmill at Tenmile River was moved to Fort Bragg and the town was established.

Climate

Western Mendocino County has a mild climate and abundant rainfall. Temperatures near the coast remain cool throughout the year. Summer temperatures are higher and winter temperatures lower in the eastern part of the survey area. The average annual air temperature ranges from 53 to 57 degrees F. Precipitation averages about 35 to 80 inches per year and occurs mostly from October through April. The average annual frost-free season ranges from 150 to 365 days. Cool moist air over the Pacific Ocean has a profound influence on temperatures in much of the survey area. The cool marine air minimizes the difference between summer and winter temperatures. At Fort Bragg the difference in the average temperature of the coolest month (January) and the warmest month (September) is only 8 degrees F, but 11 miles inland, at Branscomb, the difference in temperature between the coolest and warmest month is 23 degrees F. The marine air also minimizes the difference between daytime and nighttime temperatures. At Fort Bragg the variation between average high and average low temperatures for August is 15 degrees F, and at Branscomb this difference is 35 degrees (University of California Cooperative Extension). Where little fluctuation in seasonal air temperatures occurs, there is little fluctuation in seasonal soil temperature (USDA, 1975). The influence of the marine air diminishes with increasing elevation and distance from the coastline. Along major river channels the moist marine air may extend inland 25 miles or more.

The marine influence and the abundant rainfall favor the growth of vast redwood forests. Precipitation throughout the survey area ranges from about 35 to 80 inches per year. The lesser amounts occur along the immediate coast near Fort Bragg and Point Arena. The greater amounts occur near Branscomb and in the extreme northwest corner of the survey area.

Snowfall is rare at low elevations but averages 15 inches or more at the higher elevations west of Laytonville and east of Leggett. More than 90 percent of the annual precipitation falls in the months of October through April (University of California Cooperative Extension). Marine fog commonly occurs in coastal areas, especially during the nearly rainless summer months. The fog frequently moves inland over the lower elevations in the evening but burns off by midday. At the lower elevations near the coast, the fog may persist for several days before dissipating. These fogs reduce the moisture stress on vegetation, slow the rate of soil moisture depletion, and in some cases may actually provide additional soil moisture.

Physiography, Relief, and Drainage

Western Mendocino County is part of the California Coast Range. The survey area is

Figure 2.—Strongly sloping to extremely steep areas covered by Douglas-fir and redwood dominate the landscape throughout the survey area. Pictured is an area of Yellowhound-Kibesillah complex, 50 to 75 percent slopes.

characterized by steep and very steep, northwest-trending mountain ridges dissected by perennial streams and rivers. It consists of three physiographic regions. Hilly and mountainous uplands make up about 90 percent of the survey area. They range in elevation from near sea level to 4,235 feet at Cahto Peak. Small intermountain valleys consisting of stream terraces and flood plains range in elevation from near sea level to 2,000 feet in the Laytonville Valley. The two most significant valleys, the Anderson and Laytonville Valleys, have a combined area of about 10,000 acres.

Marine terraces occur in a narrow band (up to 7 miles wide) along the coast between the Gualala River and Westport. They range in elevation from sea level to about 1,900 feet east of Manchester. Numerous rivers and creeks drain the survey area. The west-trending Gualala, Garcia, Navarro, Albion,

Big, Noyo, and Tenmile Rivers have their outlet at the Pacific Ocean within the survey area. The northeastern part of the survey area is drained by the northwest-trending Eel River system, which empties into the Pacific Ocean in Humboldt County. Some areas in the southeastern part of the survey area are in the Russian River watershed.

Water Supply

The city of Fort Bragg is served by a municipal water system that draws water from the Noyo River. Anchor Bay, Gualala, and Point Arena are served by private water companies. The communities of Elk and Westport and some subdivisions are served by community water systems. Most residents, however, live outside these water districts. They rely on wells and springs that are recharged annually by winter rains. The yield from these sources may vary from year to year. Deficiencies may occur, especially during years of low rainfall. Water storage systems are sometimes used. In the Anderson Valley and along the southern coast, small reservoirs provide farmers with water for irrigation. These reservoirs also provide water for frost protection of vineyards in the Anderson Valley.

Transportation Facilities

One U.S. highway and three State highways provide the major transportation routes in western Mendocino County. U.S. Highway 101 and State Highway 1 are the major north-south routes. State Highway 20 provides an east-west route connecting Highway 1 at Fort Bragg with Highway 101 at Willits. State Highway 128 provides an east-west route between Highway 101 at Cloverdale (Sonoma County) and Highway 1 at the mouth of the Navarro River. Train service is provided by the California Western Skunk Train, which travels between Fort Bragg and Willits. Although primarily a tourist attraction, the Skunk Train is also used to ship lumber from Fort Bragg. Two small harbors, at Fort Bragg and Albion, serve as mooring basins for commercial fishing boats and pleasure craft. The Mendocino County Airport at Little River is the largest airport in the survey area. The 1-mile runway can accommodate heavy jet aircraft. Smaller airports serve the communities of Boonville and Gualala.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind or segment of the landscape. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Individual soils on the landscape commonly merge into one another as their characteristics gradually change. To construct an accurate map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile.

After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

The descriptions, names, and delineations of the soils in this survey area do not fully agree with those of the soils in adjacent survey areas. Differences are the result of a better knowledge of soils, modifications in series concepts, or variations in the intensity of mapping or in the extent of the soils in the survey areas.

This survey area was mapped at two levels of detail. At the more detailed level, map units are narrowly defined. Map unit boundaries were plotted and verified at closely spaced intervals. At the less detailed level, map units are broadly defined. Boundaries were plotted and verified at wider intervals. The inland valleys and the coastal terraces were mapped at a more detailed level than the uplands. The detail of mapping was selected to meet the anticipated long-term use of the survey, and the map units were designed to meet the needs for that use. Some areas were not mapped because access was denied to the mappers by the landowner. These areas are indicated by the symbol 246 (access denied) on the detailed soil maps.

General Soil Map Units

The general soil map included with this publication shows broad areas that have a distinctive pattern of soils, vegetation, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. A map unit consists of one or more major soils and some minor soils or miscellaneous areas. It is named for the major soils. The soils or miscellaneous areas making up one unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils or miscellaneous areas can be identified on the map. Likewise, areas that are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

1. Ferncreek-Quinliven-Shinglemill

Very deep, gently sloping to steep, poorly drained to moderately well drained soils that have little seasonal fluctuation in soil temperature and that formed in marine terrace deposits; on marine terraces

This map unit is on marine terraces bordering the Pacific Ocean. The vegetation is mainly redwood, Douglas-fir, and bishop pine on the Quinliven and Ferncreek soils and bishop pine and Mendocino cypress on the Shinglemill soils. Elevation ranges from sea level to 1,000 feet. The average annual precipitation ranges from 35 to 65 inches, the average annual air temperature is about 53 degrees F, and the average frost-free season is 250 to 365 days. A strong marine influence minimizes seasonal fluctuation in air temperature and thus results in little fluctuation in soil temperature.

This unit makes up about 8 percent of the survey area. It is about 31 percent Ferncreek and similar soils, 25 percent Quinliven and similar soils, 11 percent Shinglemill and similar soils, and 33 percent soils and miscellaneous areas of minor extent.

Ferncreek soils are somewhat poorly drained. Typically, the surface layer is sandy loam. The subsoil is clay loam, clay, or sandy clay loam. The substratum to a depth of 60 inches or more is sandy loam. Slope ranges from 2 to 30 percent.

Quinliven soils are moderately well drained. Typically, the surface layer is sandy loam. The subsoil is clay. The substratum to a depth of 60 inches or more is sandy loam. Slope ranges from 2 to 50 percent.

Shinglemill soils are poorly drained. Typically, the surface layer is loam. The subsoil extends to a depth of 60 inches or more. It is clay or sandy clay. Slope ranges from 2 to 15 percent.

Of minor extent in this unit are Dystropepts, Tropaquepts, and Abalobadiah, Aborigine, Biaggi, Blacklock, Bruhel, Cabrillo, Caspar, Cleone, Crispin, Fishrock, Flumeville, Gibney, Gibwell, Harecreek, Havensneck, Heeser, Iversen, Mackerricher, Mallopass, Seaside, Sirdrak, Stornetta, Tregoning, Vandamme, Vizcaino, and Windyhollow soils. Also included are areas of Coastal beaches, Duneland, Pits and Dumps, Riverwash, Rock outcrop, and Urban land and areas to which access was denied for purposes of this soil survey.

Most areas of this map unit are used for timber production or homesite development. Some areas are used for recreation.

The main limitations in areas used for timber production are seasonal wetness and the slope. The main limitations in areas used for homesite development are the slope, low strength, seasonally saturated soil conditions, and restricted permeability in the subsoil.

2. Boontling-Pinole-Cole

Very deep, nearly level to moderately steep, somewhat poorly drained and well drained soils that formed in alluvium; on river terraces

This map unit is on river terraces and flood plains in the Laytonville and Anderson Valleys. Many areas are cultivated. In uncultivated areas the vegetation is mainly annual grasses and forbs. Elevation ranges from 160 to 1,750 feet. The average annual precipitation ranges from 40 to 60 inches, the average annual air temperature is about 55 degrees F, and the frost-free season is 150 to 250 days.

This map unit makes up about 1 percent of the survey area. It is about 30 percent Boontling and similar soils, 25 percent Pinole and similar soils, 15 percent Cole soils, and 30 percent soils and miscellaneous areas of minor extent.

Boontling soils are somewhat poorly drained. Typically, the surface layer is loam. The subsoil extends to a depth of 60 inches or more. It is loam, clay loam, or gravelly clay loam. Slope ranges from 2 to 30 percent.

Pinole soils are well drained. Typically, the surface layer is loam. The subsoil extends to a depth of 60 inches or more. It is clay loam. Slope ranges from 2 to 15 percent.

Cole soils are somewhat poorly drained. Typically, the surface layer is loam. The subsoil extends to a depth of 60 inches or more. It is clay loam. Slope ranges from 0 to 5 percent.

Of minor extent in this unit are Argixerolls, Haploxeralfs, and Xerochrepts and Bearwallow, Feliz, Perrygulch, Talmage, and Wolfey soils. Also included are areas of Riverwash and Pits and Dumps.

Areas of this unit are used mainly for production of wine grapes and apples in the Anderson Valley and for livestock grazing in the Laytonville Valley. Some areas are used for homesite development.

In areas of the Boontling and Cole soils that are used for the production of wine grapes and apples, the major limitation is the seasonal saturation of the soils. No major limitations affect the use of the Pinole soils for the production of wine grapes and apples. In areas of the Boontling and Cole soils that are used for homesite development, the main limitations are the seasonally saturated soil conditions and the restricted permeability in the subsoil.

3. Irmulco-Dehaven-Vandamme

Deep and very deep, gently sloping to very steep, well drained soils that have little seasonal fluctuation in soil temperature and that formed in material weathered from sandstone; on hills

This map unit is on hills and in the uplands. It generally borders the Pacific Ocean, but in areas of marine terraces it is directly east of the terraces. The vegetation is mainly redwood and Douglas-fir. Elevation ranges from sea level to 1,000 feet. The average annual precipitation ranges from 40 to 70 inches, the average annual air temperature is about 53 degrees F, and the frost-free season is 290 to 365 days. A strong marine influence minimizes seasonal fluctuation in air temperature and thus results in little fluctuation in soil temperature.

This map unit makes up about 21 percent of the survey area. It is about 35 percent Irmulco soils, 20 percent Dehaven soils, 15 percent Vandamme soils, and 30 percent soils and miscellaneous areas of minor extent.

Irmulco soils are deep or very deep. Typically, the surface layer is loam. The subsoil is loam or clay loam. Soft sandstone bedrock is at a depth of 40 to 80 inches. Slope ranges from 9 to 75 percent.

Dehaven soils are deep. Typically, the surface layer is gravelly loam. The subsoil is very gravelly and extremely gravelly sandy clay loam. Hard sandstone bedrock is at a depth of 40 to 60 inches. Slope ranges from 30 to 99 percent.

Vandamme soils are deep. Typically, the surface layer is loam. The subsoil is clay loam or clay. Soft sandstone bedrock is at a depth of 40 to 60 inches. Slope ranges from 2 to 75 percent.

Of minor extent in this unit are Dystropepts and Bigriver, Branscomb, Carlain, Cottoneva, Glenblair, Hotel, Tramway, and Usal soils. Also included are areas of water, areas of Riverwash, and areas to which access was denied for purposes of this soil survey.

Areas of this unit are used mainly for timber production or as watershed.

In areas used for timber harvesting, the slope and seasonal wetness are the major limitations.

4. Ornbaun-Zeni-Yellowhound

Deep and moderately deep, strongly sloping to very steep, well drained soils that have little seasonal fluctuation in soil temperature and that formed in material weathered from sandstone; on hills and mountains

This map unit is on hilly and mountainous uplands. The vegetation is mainly Douglas-fir and redwood. Elevation ranges from 200 to 2,500 feet. The average

annual precipitation ranges from 40 to 70 inches, the average annual air temperature is about 53 degrees F, and the average frost-free season is 220 to 320 days. A strong marine influence minimizes seasonal fluctuation in air temperature and thus results in little fluctuation in soil temperature.

This map unit makes up about 33 percent of the survey area. It is about 30 percent Ornbaun soils, 20 percent Zeni soils, 20 percent Yellowhound soils, and 30 percent soils and miscellaneous areas of minor extent.

Ornbaun soils are deep. Typically, the surface layer is loam. The subsoil is loam or clay loam. Soft sandstone bedrock is at a depth of 40 to 60 inches. Slope ranges from 9 to 75 percent.

Zeni soils are moderately deep. Typically, the surface layer is loam. It is underlain by a subsoil of loam. Soft sandstone bedrock is at a depth of 20 to 40 inches. Slope ranges from 9 to 75 percent.

Yellowhound soils are deep. Typically, the surface layer is gravelly loam. The subsoil is extremely gravelly loam. Hard sandstone bedrock is at a depth of 40 to 60 inches. Slope ranges from 9 to 99 percent.

Of minor extent in this unit are Comptche, Frenchman, Gschwend, Kibesillah, Threechop, and Woodin soils. Also included are areas of Riverwash and areas of water.

Most areas of this unit are used for timber production or as watershed.

In areas used for timber harvesting, the major limitations are the slope and seasonal wetness.

5. Casabonne-Holohan-Wohly

Moderately deep to very deep, strongly sloping to very steep, well drained soils that formed in material weathered from sandstone; on hills and mountains

This map unit is on hilly and mountainous uplands. The vegetation is mainly Douglas-fir and tanoak. Elevation ranges from 500 to 4,235 feet. The average annual precipitation ranges from 40 to 80 inches, the average annual air temperature is about 55 degrees F, and the average frost-free season is 150 to 270 days.

This map unit makes up about 26 percent of the survey area. It is about 27 percent Casabonne soils, 26 percent Holohan soils, 17 percent Wohly soils, and 30 percent soils and miscellaneous areas of minor extent.

Casabonne soils are deep. Typically, the surface layer is loam. The subsoil is clay loam. Hard sandstone bedrock is at a depth of 40 to 60 inches. Slope ranges from 9 to 75 percent.

Holohan soils are very deep. Typically, the surface layer is extremely gravelly sandy loam. The subsoil is very gravelly loam or extremely gravelly loamy sand. Hard sandstone bedrock is at a depth of 60 to 80 inches. Slope ranges from 9 to 75 percent.

Wohly soils are moderately deep. Typically, the surface layer is loam. The subsoil is clay loam or gravelly clay loam. Soft sandstone bedrock is at a depth of 20 to 40 inches. Slope ranges from 9 to 75 percent.

Of minor extent in this unit are Dann, Etsel, Garcia, Gube, Hiltabidel, Hollowtree, Hopland, Littlered, Maymen, Pardaloe, Snook, Tyson, Updegraff, Woodin, and Yellowhound soils. Also included are areas of Riverwash and areas of water.

Most areas of this unit are used for timber production or as watershed.

In areas used for timber harvesting, the major limitations are the slope and seasonal wetness.

6. Hopland-Squawrock-Witherell

Moderately deep and shallow, strongly sloping to very steep, well drained and somewhat excessively drained soils that formed in material weathered from sandstone; on hills and mountains

This map unit is on hilly and mountainous uplands. The vegetation is mainly hardwoods on the Hopland soils and annual grasses on the Squawrock and Witherell soils. Elevation ranges from 200 to 4,000 feet. The average annual precipitation ranges from 45 to 70 inches, the average annual air temperature is about 57 degrees F, and the average frost-free season is 150 to 250 days.

This unit makes up about 7 percent of the survey area. It is about 35 percent Hopland soils, 25 percent Squawrock soils, 15 percent Witherell soils, and 25 percent soils of minor extent.

Hopland soils are moderately deep and are well drained. Typically, the surface layer and subsoil are loam. Soft sandstone bedrock is at a depth of 20 to 40 inches. Slope ranges from 30 to 75 percent.

Squawrock soils are moderately deep and are well drained. Typically, the surface layer is gravelly loam. The subsoil is very gravelly loam or very gravelly clay loam. Hard sandstone bedrock is at a depth of 20 to 40 inches. Slope ranges from 15 to 75 percent.

Witherell soils are shallow and are somewhat excessively drained. Typically, the surface layer and subsoil are loam. Hard sandstone bedrock is at a depth of 10 to 20 inches. Slope ranges from 9 to 75 percent.

Of minor extent in this unit are Bearwallow, Garcia, Wohly, and Wolfey soils.

Most areas of the Squawrock and Witherell soils are used for livestock grazing. Most areas of the Hopland soils are used for firewood production.

In areas used for livestock grazing, the major limitation is the slope. The low available water capacity of the Squawrock soils and the limited rooting depth of the Witherell soils are additional limitations. In areas of the Hopland soils that are used for firewood production, the major limitations are the slope and seasonal wetness.

7. Yorkville-Shortyork-Witherell

Shallow to very deep, strongly sloping to very steep, moderately well drained to somewhat excessively drained soils that formed in material weathered from sandstone and schist; on hills and mountains

This map unit is on hilly and mountainous uplands. The vegetation is mainly annual grasses. Elevation ranges from 500 to 4,000 feet. The average annual precipitation ranges from 45 to 70 inches, the average annual air temperature is about 57 degrees F, and the average frost-free season is 150 to 250 days.

This map unit makes up about 4 percent of the survey area. It is about 40 percent Yorkville soils, 25 percent Shortyork soils, 15 percent Witherell soils, and 20 percent soils of minor extent.

Yorkville soils are very deep and are moderately well drained. Typically, the surface layer is clay loam. The subsoil is clay. Hard schist bedrock is at a depth of 40 to 60 inches. Slope ranges from 9 to 50 percent.

Shortyork soils are moderately deep and are well drained. Typically, the surface layer is loam. The subsoil is very gravelly clay loam or very cobbly clay loam. The substratum is extremely gravelly sandy loam. Hard schist bedrock is at a depth of 20 to 40 inches. Slope ranges from 9 to 50 percent.

Witherell soils are shallow and are somewhat excessively drained. Typically, the surface layer and subsoil are loam. Hard sandstone bedrock is at a depth of 10 to 20 inches. Slope ranges from 9 to 75 percent.

Of minor extent in this unit are Hopland, Squawrock, Tyson, and Yorktree soils.

Most areas of this unit are used for livestock grazing or wildlife habitat.

In areas used for livestock grazing, the main limitation is the slope. Seasonal wetness on the Yorkville soils and a limited effective rooting depth in the Witherell soils are additional limitations.

Detailed Soil Map Units

The map units delineated on the detailed soil maps in this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a map unit for specific uses. They also can be used to plan the management needed for those uses. More specific information about land uses is given under the heading “Use and Management of the Soils.”

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. Soils, however, are natural phenomena, and they have the characteristic variability of all natural phenomena. They typically blend into each other on the landscape as their properties gradually change. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some “included” areas that belong to other taxonomic classes.

Some included soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, inclusions. They may or may not be mentioned in the map unit description. Other included soils and miscellaneous areas, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, inclusions. They generally are in small areas and could not be mapped separately because of the scale used. The included areas of contrasting soils or miscellaneous areas are mentioned in the map unit descriptions. A few included areas may not have been observed, and consequently they are not mentioned in the descriptions.

The presence of included areas in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for broad resource planning, but if intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

On the soil maps, each map unit is identified with a number. This number precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying layers, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying layers. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Pinole loam, 2 to 9 percent slopes, is a phase of the Pinole series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Ornbaun-Zeni complex, 30 to 50 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps.

Because of present or anticipated uses of the map unit in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Hopland-Squawrock association, 50 to 75 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Blacklock and Aborigine soils, 0 to 5 percent slopes, is an undifferentiated group in this survey area.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Duneland is an example.

Table 1 gives the acreage and proportionate extent of each map unit. Other tables (see Contents) give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

101—Abalobadiah-Bruhel-Vizcaino complex, 30 to 50 percent slopes

This map unit is on coastal hills and mountains. The vegetation is mainly perennial grasses and forbs or brush. Elevation ranges from 50 to 1,300 feet. The average annual precipitation is 40 to 55 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 250 to 330 days.

This unit is about 35 percent Abalobadiah loam, 30 percent Bruhel loam, and 25 percent Vizcaino loam. These three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Dystropepts and small areas of soils south of Russian Gulch that support bishop pine and fir. Also included are small areas that have slopes of 15 to 30 percent or 50 to 75 percent. Included areas make up about 10 percent of the total acreage of the unit. The percentage varies from one area to another.

The Abalobadiah soil is moderately deep to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface layer is grayish brown loam about 13 inches thick. The upper part of the subsoil is brown sandy clay loam about 8 inches thick. The lower part of the subsoil is very pale brown gravelly sandy loam about 18 inches thick. Soft, fractured sandstone is at a depth of about 39 inches.

Permeability is moderate in the Abalobadiah soil. Available water capacity is low. The effective rooting depth is limited by weathered bedrock at a depth of 20 to 40 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

The Bruhel soil is deep or very deep to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface layer is dark grayish brown loam about 4 inches thick. The upper 17 inches of the subsoil is grayish brown clay loam. The lower 20 inches is brown gravelly loam and gravelly clay loam. Soft sandstone bedrock is at a depth of about 41 inches.

Permeability is moderate in the Bruhel soil. Available water capacity also is moderate. The effective rooting depth is limited by weathered bedrock at a depth of 40 to 70 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

The Vizcaino soil is shallow to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface layer is grayish brown loam about 2 inches thick. The upper 11 inches of the subsoil is dark grayish brown sandy clay loam. The lower 4 inches is dark grayish brown gravelly clay loam. Soft sandstone bedrock is at a depth of about 17 inches.

Permeability is moderate in the Vizcaino soil. Available water capacity is low. The effective rooting depth is limited by weathered bedrock at a depth of 12 to 20 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

This unit is used for limited livestock grazing or as wildlife habitat.

The characteristic plant community is mainly purple needlegrass, hairy oatgrass, common velvetgrass, and California oatgrass. The main limitation affecting range management is the slope, which limits access by livestock and results in overgrazing of the less sloping areas. Fencing, water development, and the strategic location of salt blocks can help to control the distribution of livestock.

The capability classification is VIe(4), nonirrigated.

102—Abalobadiah-Bruhel-Vizcaino complex, 50 to 75 percent slopes

This map unit is on coastal hills and mountains. The vegetation is mainly perennial grasses and forbs or brush. Elevation ranges from 50 to 1,300 feet. The average annual precipitation is 40 to 55 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 250 to 330 days.

This unit is about 40 percent Abalobadiah loam, 25 percent Bruhel loam, and 25 percent Vizcaino loam. These three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Dystropepts. Also included are small areas that have slopes of 30 to 50 percent or 75 to 99 percent. Included areas make up about 10 percent of the total acreage of the unit. The percentage varies from one area to another.

The Abalobadiah soil is moderately deep to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface layer is grayish brown loam about 13 inches thick. The upper part of the subsoil is brown sandy clay loam about 8 inches thick. The lower part of the subsoil is very pale brown gravelly sandy loam about 18 inches thick. Soft, fractured sandstone is at a depth of about 39 inches.

Permeability is moderate in the Abalobadiah soil. Available water capacity is low. The effective rooting depth is limited by weathered bedrock at a depth of 20 to 40 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

The Bruhel soil is deep or very deep to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface layer is dark grayish brown loam about 4 inches thick. The upper 17 inches of the subsoil is dark grayish brown and grayish brown clay loam. The lower 20 inches is brown gravelly clay loam and pale brown gravelly loam. Soft sandstone bedrock is at a depth of about 41 inches.

Permeability is moderate in the Bruhel soil. Available water capacity also is moderate. The effective rooting depth is limited by weathered bedrock at a depth of 40 to 70 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

The Vizcaino soil is shallow to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface layer is grayish brown loam about 2 inches thick. The upper 11 inches of the subsoil is dark grayish brown sandy clay loam. The lower 4 inches is dark grayish brown gravelly clay loam. Soft sandstone bedrock is at a depth of about 17 inches.

Permeability is moderate in the Vizcaino soil. Available water capacity is low. The effective rooting depth is limited by weathered bedrock at a depth of 12 to 20 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

This unit is used for limited livestock grazing or as wildlife habitat.

The characteristic plant community is mainly purple needlegrass, hairy oatgrass, common velvetgrass, and California oatgrass. The main limitation affecting range management is the slope, which limits access by livestock and results in overgrazing of the less sloping areas. Fencing, water development, and the strategic location of salt blocks can help to control the distribution of livestock.

The capability classification is VIIe(4), nonirrigated.

103—Bearwallow-Wolfey complex, 5 to 15 percent slopes

This map unit is on convex ridges and foot slopes of hills and mountains. The vegetation is mainly annual grasses and forbs. Elevation ranges from 300 to 2,500 feet. The average annual precipitation is 45 to 60 inches, the average annual air temperature is about 57 degrees F, and the average frost-free period is 150 to 250 days.

This unit is about 55 percent Bearwallow loam and 30 percent Wolfey loam. The Bearwallow and Wolfey soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Pinole, Hopland, and Boontling soils. Also included are small areas that have slopes of 2 to 5 percent or 15 to 30 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

The Bearwallow soil is moderately deep to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface layer is pale brown loam about 8 inches thick. The upper 10 inches of the subsoil also is pale brown loam. The lower 16 inches is variegated light yellowish brown and reddish yellow loam. Soft, fractured sandstone is at a depth of about 34 inches.

Permeability is moderately slow in the Bearwallow soil. Available water capacity is moderate. The effective rooting depth is limited by weathered bedrock at a depth of 20 to 40 inches. Surface runoff is medium, and the hazard of water erosion is moderate if the surface is left bare.

The Wolfey soil is shallow to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface layer is light yellowish brown loam about 3 inches thick. The subsoil also is light yellowish brown loam. It is about 12 inches thick. Soft sandstone bedrock is at a depth of about 15 inches.

Permeability is moderate in the Wolfey soil. Available water capacity is very low. The effective rooting depth is limited by weathered bedrock at a depth of 10 to 20 inches. Surface runoff is medium, and the hazard of water erosion is moderate if the surface is left bare.

This unit is used for livestock grazing, wine grape production, or wildlife habitat.

The characteristic plant community is mainly wild oat, soft chess, and filaree. Soil properties generally do not limit range management practices on the Bearwallow soil. The main limitation affecting range management in areas of the Wolfey soil is the shallow effective rooting depth, which limits production of forage. If range seeding is considered, species that are tolerant of droughty conditions should be selected.

The main limitations affecting wine grape production are the slope, the hazard of erosion, and the shallow depth to soft sandstone in the Wolfey soil. Contour farming and the use of cover crops help to control erosion. Managing cover crops by mowing instead of tillage helps to control erosion and reduces energy consumption.

Irrigation may be needed if grapes are to be established. Sprinkler and drip irrigation methods are suitable for vineyards in areas of this unit. These methods permit the even, controlled application of water, minimize runoff, and reduce the hazard of erosion.

The capability classification is IVe-1(15), nonirrigated.

104—Bearwallow-Wolfey complex, 15 to 30 percent slopes

This map unit is on hills and mountains. The vegetation is mainly annual grasses and forbs. Elevation ranges from 300 to 2,500 feet. The average annual precipitation is 45 to 60 inches, the average annual air temperature is about 57 degrees F, and the average frost-free period is 150 to 250 days.

This unit is about 55 percent Bearwallow loam and 30 percent Wolfey loam. The Bearwallow and Wolfey soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Pinole, Witherell, Squawrock, Hopland, and Boontling soils. Also included are small areas that have slopes of 9 to 15 percent or 30 to 50 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

The Bearwallow soil is moderately deep to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface layer is pale brown loam about 8 inches thick. The upper 10 inches of the subsoil also is pale brown loam. The lower 16 inches is variegated light yellowish brown and reddish yellow loam. Soft, fractured sandstone is at a depth of about 34 inches.

Permeability is moderately slow in the Bearwallow soil. Available water capacity is moderate. The effective rooting depth is limited by weathered bedrock at a depth of 20 to 40 inches. Surface runoff is rapid, and the hazard of water erosion is moderate if the surface is left bare.

The Wolfey soil is shallow to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface layer is light yellowish brown loam about 3 inches thick. The subsoil also is light yellowish brown loam. It is about 12 inches thick. Soft sandstone bedrock is at a depth of about 15 inches.

Permeability is moderate in the Wolfey soil. Available water capacity is very low. The effective rooting depth is limited by weathered bedrock at a depth of 10 to 20 inches. Surface runoff is rapid, and the hazard of water erosion is moderate if the surface is left bare.

This unit is used for livestock grazing or as wildlife habitat. A few areas are used for wine grape production.

The characteristic plant community is mainly wild oat, soft chess, and filaree. Soil properties generally do not limit range management practices on the Bearwallow soil. The main limitation affecting range management in areas of the Wolfey soil is the shallow effective rooting depth, which limits production of forage. If range seeding is considered, species that are tolerant of droughty conditions should be selected.

The main limitations affecting wine grape

production are the slope, the hazard of erosion, and the shallow depth to soft sandstone in the Wolfey soil. Contour farming and the use of cover crops help to control erosion. Managing cover crops by mowing instead of tillage helps to control erosion and reduces energy consumption. Irrigation is needed if grapes are to be established. Sprinkler and drip irrigation methods are suitable for vineyards in areas of this unit. These methods permit the even, controlled application of water, minimize runoff, and reduce the hazard of erosion.

The capability classification is IVe-1(15), irrigated and nonirrigated.

105—Biaggi loam, 0 to 5 percent slopes

This moderately deep, well drained soil is on marine terraces. It formed in material derived from sandstone or shale. The vegetation is mainly perennial grasses and forbs. Elevation ranges from 100 to 400 feet. The average annual precipitation is 35 to 45 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 250 to 330 days.

Typically, the surface layer is brown loam. It is about 23 inches deep over hard sandstone bedrock.

Included with this soil in mapping are small areas of Cabrillo, Crispin, Flumeville, Heeser, Mallopass, and Windyhollow soils. Also included are small areas that have slopes of 5 to 9 percent. Included areas make up about 20 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is moderate in the Biaggi soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is slow, and the hazard of water erosion is slight if the surface is left bare.

This unit is used for livestock grazing, homesite development, or wildlife habitat.

In areas used for livestock grazing, the characteristic plant community is mainly California oatgrass, hairy oatgrass, and common velvetgrass. Soil properties generally do not limit range management practices.

The main limitation affecting homesite development is the moderate depth to bedrock, which increases the possibility of failure of septic tank absorption fields. Alternative systems may be needed, such as those in which leach lines are placed in a mound above the soil surface.

Windbreaks may be desirable on this unit to protect buildings, livestock, and fields from prevailing winds. Few limitations affect the establishment of windbreaks. Supplemental irrigation may be needed when windbreaks are established and during dry periods. Among the trees that are suitable for planting are eucalyptus, Monterey cypress, Monterey pine, and bishop pine.

The capability classification is IIIe-1(4), irrigated and nonirrigated.

106—Biaggi loam, 5 to 15 percent slopes

This moderately deep, well drained soil is on marine terraces. It formed in material derived from sandstone or shale. The vegetation is mainly perennial grasses and forbs. Elevation ranges from 100 to 400 feet. The average annual precipitation is 35 to 45 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 250 to 330 days.

Typically, the surface layer is brown loam. It is about 23 inches deep over hard sandstone bedrock.

Included with this soil in mapping are small areas of Abalobadiah, Bruhel, Mallopass, Vizcaino, and Windyhollow soils. Also included are small areas that have slopes of 2 to 5 percent or 15 to 30 percent. Included areas make up about 20 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is moderate in the Biaggi soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is medium, and the hazard of water erosion is moderate if the surface is left bare.

This unit is used for livestock grazing, homesite development, or wildlife habitat.

In areas used for livestock grazing, the characteristic plant community is mainly California oatgrass, hairy oatgrass, and common velvetgrass. Soil properties generally do not limit range management practices.

The main limitations affecting homesite development are the slope and the moderate depth to bedrock. Excavations for roads and buildings increase the hazard of erosion. Revegetating disturbed areas around construction sites as soon as possible helps to control erosion. The design of access roads should control surface runoff and help to stabilize cut slopes. The moderate depth to bedrock increases the possibility of failure of septic tank absorption fields. Alternative systems may be needed, such as those in which leach lines are placed in a mound above the soil surface.

Windbreaks may be desirable on this unit to protect buildings, livestock, and fields from prevailing winds. Few limitations affect the establishment of windbreaks. Supplemental irrigation may be needed

when windbreaks are established and during dry periods. Among the trees that are suitable for planting are eucalyptus, Monterey cypress, Monterey pine, and bishop pine.

The capability classification is IIIe-1(4), irrigated and nonirrigated.

107—Bigriver loamy sand, 0 to 5 percent slopes

This very deep, well drained soil is on flood plains. It formed in alluvium derived from sandstone. The vegetation is mainly redwood. Elevation ranges from 10 to 125 feet. The average annual precipitation is 45 to 65 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 290 to 365 days.

Typically, the surface layer is variegated pale brown and very pale brown loamy sand about 6 inches thick. The underlying material to a depth of 63 inches or more is variegated brown, yellowish brown, pale brown, very pale brown, light yellowish brown, and grayish brown, stratified loamy sand, sandy loam, and loam. In some areas the surface layer is sandy loam.

Included with this soil in mapping are small areas of Cottoneva soils and areas of Riverwash. These included areas make up about 20 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is moderately rapid in the Bigriver soil. Available water capacity is moderate. The effective rooting depth is more than 60 inches. Surface runoff is slow, and the hazard of water erosion is slight if the surface is left bare. This soil is frequently flooded for brief periods from December through April.

This unit is used mainly for timber production or wildlife habitat. A few areas are used for recreation.

Redwood is the main tree species on this soil. On the basis of a 100-year site curve, the mean site index for redwood is 188. The potential annual production from a fully stocked stand of redwood is 2,050 board feet per acre. Trees of limited extent include red alder.

The main limitation affecting the harvesting of timber is the seasonal wetness. Ponding limits the use of equipment to dry periods. Unsurfaced roads and skid trails are soft when wet. They may be impassable during rainy periods. Suitable surfacing of roads is needed for use during wet seasons. Rock for construction of roads generally is not available in areas of this unit.

Plant competition is a concern affecting the production of timber. When openings are made in the canopy, invading brushy plants that are not controlled can delay the establishment of planted seedlings. Reforestation can be accomplished by planting redwood seedlings. After it is cut, redwood may regenerate by sprouting, thereby providing adequate stocking.

Among the common forest understory plants are oxalis, swordfern, western thimbleberry, starflower, and trillium.

The capability classification is IVw-2(4), nonirrigated.

108—Blacklock and Aborigine soils, 0 to 5 percent slopes

This map unit is on marine terraces. The vegetation is mainly stunted Mendocino cypress, which is known locally as “pygmy forest.” Elevation ranges from 250 to 650 feet. The average annual precipitation is 50 to 65 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 270 to 330 days.

The composition of the soils in this map unit is highly variable. An individual area may be made up of either or both of the soils. Each area, however, has similar management requirements for most uses.

Included with these soils in mapping are small areas of Shinglemill soils and Tropaquepts. These included soils make up about 20 percent of the total acreage of the unit. The percentage varies from one area to another.

The Blacklock soil is shallow to a hardpan and is very poorly drained. It formed in marine sediments. Typically, the surface is irregularly covered with a mat of litter about 1/2 inch thick. The surface layer is gray loamy sand about 7 inches thick. The subsurface layer is white and brown sandy loam about 7 inches thick. The next layer is a hardpan about 47 inches thick. It is weakly cemented to strongly cemented. The underlying material to a depth of 64 inches or more is very pale brown loamy sand that has yellowish red mottles.

Permeability is very slow in the Blacklock soil. Available water capacity is very low. The effective rooting depth is limited by the hardpan at a depth of 12 to 20 inches. The soil is saturated for long periods following episodes of heavy rain from December through April. The saturated zone starts at the surface and extends to the top of the hardpan. Surface runoff is very slow or slow, and the hazard of water erosion is slight if the surface is left bare.

The Aborigine soil is very deep and is very poorly drained. It formed in marine sediments. Typically, the

surface is covered with a mat of litter about 3 inches thick. The surface layer is light gray and white sandy loam about 6 inches thick. The next 7 inches is very pale brown loam that has brownish yellow mottles. The subsoil to a depth of 61 inches or more is light gray, white, and gray clay and sandy clay that have red and brownish yellow mottles.

Permeability is very slow in the Aborigine soil. Available water capacity is high. The effective rooting depth is limited by saturation for long periods following episodes of heavy rain from December through April. The saturated zone starts between the surface and a depth of 12 inches and extends to a depth of more than 60 inches. Surface runoff is very slow, and the hazard of water erosion is slight if the surface is left bare.

This unit is used mainly as wildlife habitat or for homesite development. Some areas are used for recreation. A few areas have been preserved for ecological study.

A combination of unfavorable soil properties, including extreme acidity, aluminum toxicity, low nutrient content within the rooting zone, and the seasonally saturated soil conditions, results in the stunted plant growth in areas of this unit.

The main limitations affecting homesite development are low strength, the seasonally saturated soil conditions, the hardpan in the Blacklock soil, and the very slow permeability in the subsoil of the Aborigine soil. The design of buildings and roads should offset the limited ability of the soils to support a load. Surface drainage is needed for roads and building foundations. The seasonally saturated soil conditions and the very slowly permeable subsoil increase the possibility of failure of septic tank absorption fields. Alternative systems may be needed, such as those in which leach lines are placed in a mound above the soil surface.

The capability classification is VIIw(4), nonirrigated.

109—Boontling loam, 2 to 9 percent slopes

This very deep, somewhat poorly drained soil is on river terraces. It formed in alluvium derived from mixed rock sources. The vegetation in areas that are not cultivated is mainly annual grasses and forbs. Elevation ranges from 200 to 450 feet. The average annual precipitation is 40 to 50 inches, the average annual air temperature is about 56 degrees F, and the average frost-free period is 175 to 250 days.

Typically, the surface layer is brown loam about 12 inches thick. The upper 11 inches of the subsoil is pale brown loam. The next 7 inches is very pale brown loam that has brownish yellow mottles. The lower part of the subsoil to a depth of 60 inches or more is light yellowish brown clay loam and gravelly clay loam that have light gray and brownish yellow mottles.

Included with this soil in mapping are small areas of Cole, Feliz, Perrygulch, and Pinole soils. Also included are small areas that have slopes of 9 to 15 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is moderately slow in the Boontling soil. Available water capacity is high. The effective rooting depth is limited by saturation for brief or long periods following episodes of heavy rain from December through April. The saturated zone starts between the depths of 30 and 42 inches and extends to a depth of more than 60 inches. Surface runoff is slow or medium, and the hazard of water erosion is slight if the surface is left bare.

This unit is used for production of wine grapes (fig. 3) and apples or for homesite development.

This unit is suited to the production of wine grapes and apples. The main limitation affecting this use is the seasonal saturation. Tile drainage can be used if a suitable outlet is available. Managing cover crops by mowing instead of tillage helps to control erosion and reduces energy consumption.

Irrigation may be needed to establish grapes. Sprinkler and trickle irrigation methods are suitable for vineyards. These methods permit the even, controlled application of water, minimize runoff, and reduce the hazard of erosion. Wine grape production is estimated at 3.5 to 4.5 tons per acre. Apple production is estimated at 12 to 17 tons per acre.

The main limitations affecting homesite development are the seasonally saturated soil conditions and the moderately slow permeability in the subsoil. These limitations increase the possibility of failure of septic tank absorption fields. Alternative systems may be needed, such as those in which leach lines are placed in a mound above the soil surface.

The capability classification is IIIw-2(14), nonirrigated, and IIw-2(14), irrigated.

110—Boontling loam, 9 to 15 percent slopes

This very deep, somewhat poorly drained soil is on river terraces. It formed in alluvium derived from mixed rock sources. The vegetation in areas that are not cultivated is mainly annual grasses and forbs.

Figure 3.—Wine grapes in an area of Boontling loam, 2 to 9 percent slopes, in the Anderson Valley. This valley is a prime area for the production of wine grapes because of its favorable climate and soil properties. In the background, Bearwallow and Wolfey soils are on the grass-covered slopes and Hopland and Wohly soils are in wooded areas.

Elevation ranges from 200 to 450 feet. The average annual precipitation is 40 to 50 inches, the average annual air temperature is about 56 degrees F, and the average frost-free period is 175 to 250 days.

Typically, the surface layer is brown loam about 12 inches thick. The upper 11 inches of the subsoil is pale brown loam. The next 7 inches is very pale brown loam that has brownish yellow mottles. The lower part of the subsoil to a depth of 60 inches or more is light yellowish brown clay loam and gravelly clay loam that have light gray and brownish yellow mottles.

Included with this soil in mapping are small areas of Pinole soils. Also included are small areas that have slopes of 5 to 9 percent or 15 to 30 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is moderately slow in the Boontling soil. Available water capability is high. The effective rooting depth is limited by saturation for brief or long periods following episodes of heavy rain from December through April. The saturated zone starts between the depths of 30 and 42 inches and extends to a depth of more than 60 inches. Surface runoff is medium, and the hazard of water erosion is moderate if the surface is left bare.

This unit is used for production of wine grapes and apples or for homesite development.

The main limitations affecting the production of wine grapes and apples are the slope, the hazard of erosion, and the seasonally saturated soil conditions. Contour farming and cover crops help to control erosion. Managing cover crops by mowing instead of tillage helps to control erosion and reduces energy consumption. Tile drainage can be used if a suitable outlet is available.

Irrigation may be needed to establish grapes. Sprinkler and trickle irrigation methods are suitable for vineyards. These methods permit the even, controlled application of water, minimize runoff, and reduce the hazard of erosion. Wine grape production is estimated at 3.5 to 4.5 tons per acre. Apple production is estimated at 12 to 17 tons per acre.

The main limitations affecting homesite development are the slope, the seasonally saturated soil conditions, and the moderately slow permeability in the subsoil. Excavations for roads and buildings increase the hazard of erosion. The design of access roads should control surface runoff and help to stabilize cut slopes. The saturated soil conditions and the restricted permeability in the subsoil increase the possibility of failure of septic tank absorption fields. Alternative systems may be needed, such as those in which leach lines are placed in a mound above the soil surface.

The capability classification is IIIe-2(14), nonirrigated and irrigated.

111—Boontling loam, 15 to 30 percent slopes

This very deep, somewhat poorly drained soil is on river terraces. It formed in alluvium derived from mixed rock sources. The vegetation in areas that are not cultivated is mainly annual grasses and forbs. Elevation ranges from 200 to 450 feet. The average annual precipitation is 40 to 50 inches, the average annual air temperature is about 56 degrees F, and the average frost-free period is 175 to 250 days.

Typically, the surface layer is brown loam about 12 inches thick. The upper 11 inches of the subsoil is pale brown loam. The next 7 inches is very pale brown loam that has brownish yellow mottles. The lower part of the subsoil to a depth of 60 inches or more is light yellowish brown clay loam and gravelly clay loam that have light gray and brownish yellow mottles.

Included with this soil in mapping are small areas that have slopes of 9 to 15 percent or 30 to 50 percent. These areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is moderately slow in the Boontling soil. Available water capacity is high. The effective rooting depth is limited by saturation for brief or long periods following episodes of heavy rain from December through April. The saturated zone starts between the depths of 30 and 42 inches and extends to a depth of more than 60 inches. Surface runoff is rapid, and the hazard of water erosion is moderate if the surface is left bare.

This unit is used for livestock grazing, wine grape production, or wildlife habitat.

The characteristic plant community is mainly California oatgrass, blue wildrye, and ryegrass. The seasonally saturated soil conditions provide extra moisture for high forage production. This soil can provide green feed late into the summer.

If this unit is used for the production of wine grapes, the main limitations are the slope, the hazard of erosion, and the seasonally saturated soil conditions. Contour farming and the use of cover crops help to control erosion. Managing cover crops by mowing instead of tillage helps to control erosion

and reduces energy consumption. Tile drainage can be used to drain the subsoil if a suitable outlet is available.

Irrigation may be needed to establish grapes. Sprinkler and trickle irrigation methods are suitable for vineyards. These methods permit the even, controlled application of water, minimize runoff, and reduce the hazard of erosion. Wine grape production is estimated at 3.5 to 4.5 tons per acre.

The capability classification is IVe-2(14), irrigated and nonirrigated.

112—Branscomb-Usal complex, 30 to 50 percent slopes

This map unit is on steep hills. The vegetation is mainly redwood and Douglas-fir. Elevation ranges from 10 to 800 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 290 to 365 days.

This unit is about 45 percent Branscomb very gravelly loam and 40 percent Usal gravelly loam. The Branscomb and Usal soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Hotel and Vandamme soils and small areas of soils that have been drastically altered by logging activities. Some areas north of the Wheeler site (section 6, T. 13 N., R. 18 W.) do not support redwood trees. Also included are small areas that have slopes of 15 to 30 percent or 50 to 75 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

The Branscomb soil is deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 2 inches thick. The surface layer is grayish brown very gravelly loam about 10 inches thick. The subsoil is pale brown very gravelly loam and very gravelly clay loam about 40 inches thick. Hard, fractured sandstone is at a depth of about 50 inches. In some areas the surface layer is gravelly loam.

Permeability is moderate in the Branscomb soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 40 to 60 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

The Usal soil is moderately deep to bedrock and is well drained. It formed in material derived from sandstone and mudstone. Typically, the surface is covered with a mat of leaves and twigs about 2 inches thick. The surface layer is brown gravelly loam about 14 inches thick. The upper 15 inches of the subsoil is very pale brown and light yellowish brown gravelly clay loam. The lower 4 inches is light yellowish brown very gravelly clay loam. Hard, fractured sandstone and mudstone bedrock is at a depth of about 33 inches. In some areas the surface layer is loam.

Permeability is moderate in the Usal soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

This unit is used for timber production or as watershed.

Redwood and Douglas-fir are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index for redwood is 178 on the Branscomb soil and 161 on the Usal soil. The potential annual production from a fully stocked stand of redwood is 1,815 board feet per acre on the Branscomb soil and 1,460 board feet per acre on the Usal soil. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 191 on the Branscomb soil and 174 on the Usal soil. Trees of limited extent include grand fir and western hemlock.

The main limitation affecting the harvesting of timber is the slope. Wheeled and tracked equipment can be used in the more gently sloping areas, but cable yarding systems generally cause less disturbance of the soil in the steeper areas. Rock for construction of roads generally is available in areas of this unit.

Plant competition is a concern affecting the production of timber. When openings are made in the canopy, invading brushy plants that are not controlled can delay the establishment of seedlings. Reforestation can be accomplished by planting redwood or Douglas-fir seedlings. Natural reforestation by redwood sprouts and Douglas-fir seed trees provides variable stocking results. Both overstocked and understocked areas are common. Planting of redwood seedlings is not recommended in areas adjacent to the ocean that are subject to strong, persistent winds. Because of hot, dry winds from the inland Eel River watershed, redwood plantings are less successful on this unit in the area near the Humboldt County line.

Among the common forest understory plants are swordfern, toothwort, and starflower.

The capability classification is VIe(4), nonirrigated.

113—Branscomb-Usal complex, 50 to 75 percent slopes

This map unit is on hills. The vegetation is mainly redwood and Douglas-fir trees. Elevation ranges from 10 to 800 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 290 to 365 days.

This unit is about 50 percent Branscomb very gravelly loam and 30 percent Usal gravelly loam. The Branscomb and Usal soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Hotel soils and Dystropepts and small areas of soils that have been drastically altered by logging activities. In some areas the soils do not support redwood trees. Also included are small areas that have slopes of 30 to 50 percent or 75 to 99 percent. Included areas make up about 20 percent of the total acreage of the unit. The percentage varies from one area to another.

The Branscomb soil is deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 2 inches thick. The surface layer is grayish brown very gravelly loam about 10 inches thick. The subsoil is pale brown and very pale brown very gravelly loam and very gravelly clay loam about 40 inches thick. Hard, fractured sandstone is at a depth of about 50 inches. In some areas the surface layer is gravelly loam.

Permeability is moderate in the Branscomb soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 40 to 60 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

The Usal soil is moderately deep to bedrock and is well drained. It formed in material derived from sandstone and mudstone. Typically, the surface is covered with a mat of leaves and twigs about 2 inches thick. The surface layer is brown gravelly loam about 14 inches thick. The upper 15 inches of the subsoil is very pale brown and light yellowish brown gravelly clay loam. The lower 4 inches is light yellowish brown very gravelly clay loam. Hard, fractured sandstone and mudstone bedrock is at a depth of about 33 inches. In some areas the surface layer is loam.

Permeability is moderate in the Usal soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

This unit is used for timber production or as watershed.

Redwood and Douglas-fir are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index for redwood is 178 on the Branscomb soil and 161 on the Usal soil. The potential annual production from a fully stocked stand of redwood is 1,815 board feet per acre on the Branscomb soil and 1,460 board feet per acre on the Usal soil. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 191 on the Branscomb soil and 174 on the Usal soil. Trees of limited extent include grand fir and western hemlock.

The main limitations affecting the harvesting of timber are the slope and the hazard of erosion. When timber is harvested, the slope limits the use of wheeled and tracked equipment in skidding operations. Cable yarding systems generally cause less disturbance of the soil. Unless adequate plant cover or water bars are provided, steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying. Harvesting systems that lift logs entirely off the ground minimize the disturbance of the protective layer of duff. Establishing plant cover on steep cut and fill slopes reduces the hazard of surface erosion. Roads may fail and landslides may occur following deep soil disturbance in the steeper areas. Rock for construction of roads generally is available in areas of this unit. Rocks and loose soil material may slide onto roads on the Branscomb soil. This hazard increases the need for road maintenance.

Plant competition is a concern affecting the production of timber on this unit. When openings are made in the canopy, invading brushy plants that are not controlled can delay the establishment of seedlings. Reforestation can be accomplished by planting redwood or Douglas-fir seedlings. Natural reforestation by redwood sprouts and Douglas-fir seed trees provides variable stocking results. Both overstocked and understocked areas are common. Movement of loose surface material can reduce seedling survival in the steeper areas of the Branscomb soil. Planting of redwood seedlings is not recommended in areas adjacent to the ocean that are subject to strong, persistent winds. Because of hot, dry winds from the inland Eel River watershed, redwood plantings are less successful on this unit in the area near the Humboldt County line.

Among the common forest understory plants are

swordfern, toothwort, starflower, and trillium.

The capability classification is VIIe(4), nonirrigated.

114—Bruhel loam, 2 to 9 percent slopes

This well drained soil is deep or very deep to weathered bedrock. It is on marine terraces. It formed in material derived from sandstone. The vegetation is mainly perennial grasses and forbs. Elevation ranges from 50 to 800 feet. The average annual precipitation is 35 to 45 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 250 to 330 days.

Typically, the surface layer is dark grayish brown loam about 4 inches thick. The upper 17 inches of the subsoil is grayish brown clay loam. The lower 20 inches is brown gravelly loam and gravelly clay loam. Soft sandstone bedrock is at a depth of 41 inches.

Included with this soil in mapping are small areas of Biaggi, Flumeville, Mallopass, and Windyhollow soils. Also included are small areas of soils that have slopes of 9 to 15 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is moderate in the Bruhel soil. Available water capacity also is moderate. The effective rooting depth is limited by weathered bedrock at a depth of 40 to 70 inches. Surface runoff is slow or medium, and the hazard of water erosion is slight or moderate if the surface is left bare.

This unit is used mainly for livestock grazing or as wildlife habitat. A few areas are used as pasture or for hay production.

In areas used for livestock grazing, the characteristic plant community is mainly California oatgrass, hairy oatgrass, and common velvetgrass. Soil properties generally do not limit range management practices.

Windbreaks may be desirable on this unit to protect buildings, livestock, and fields from prevailing winds. Few limitations affect the establishment of windbreaks. Supplemental irrigation may be needed when windbreaks are established and during dry periods. Among the trees that are suitable for planting are eucalyptus, Monterey cypress, Monterey pine, and bishop pine.

The capability classification is IIIe-I(4), nonirrigated.

115—Bruhel-Abalobadiah-Vizcaino complex, 9 to 30 percent slopes

This map unit is on coastal hills and mountains. The vegetation is mainly perennial grasses and forbs or brush. Elevation ranges from 50 to 1,300 feet. The average annual precipitation is 40 to 55 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 250 to 330 days.

This unit is about 40 percent Bruhel loam, 30 percent Abalobadiah loam, and 20 percent Vizcaino loam. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Mallopass and Windyhollow soils. Also included are small areas that have slopes of 30 to 50 percent. Included areas make up about 10 percent of the total acreage of the unit. The percentage varies from one area to another.

The Bruhel soil is deep or very deep to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface layer is dark grayish brown loam about 4 inches thick. The upper 17 inches of the subsoil is grayish brown clay loam. The lower 20 inches is brown gravelly loam and gravelly clay loam. Soft sandstone bedrock is at a depth of 41 inches.

Permeability is moderate in the Bruhel soil. Available water capacity also is moderate. The effective rooting depth is limited by weathered bedrock at a depth of 40 to 70 inches. Surface runoff is medium or rapid, and the hazard of water erosion is moderate if the surface is left bare.

The Abalobadiah soil is moderately deep to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface layer is grayish brown loam about 13 inches thick. The upper part of the subsoil is brown sandy clay loam about 8 inches thick. The lower part of the subsoil is very pale brown gravelly sandy loam about 18 inches thick. Soft, fractured sandstone is at a depth of about 39 inches.

Permeability is moderate in the Abalobadiah soil. Available water capacity is low. The effective rooting depth is limited by weathered bedrock at a depth of 20 to 40 inches. Surface runoff is medium or rapid, and the hazard of water erosion is moderate if the surface is left bare.

The Vizcaino soil is shallow to weathered bedrock and is well drained. It formed in material derived from

sandstone. Typically, the surface layer is grayish brown loam about 2 inches thick. The upper 11 inches of the subsoil is dark grayish brown sandy clay loam. The lower 4 inches is dark grayish brown gravelly clay loam. Soft sandstone bedrock is at a depth of about 17 inches.

Permeability is moderate in the Vizcaino soil. Available water capacity is very low. The effective rooting depth is 12 to 20 inches. Surface runoff is medium or rapid, and the hazard of water erosion is moderate if the surface is left bare.

This unit is used for livestock grazing or as wildlife habitat.

The characteristic plant community is mainly purple needlegrass, hairy oatgrass, common velvetgrass, and California oatgrass. Soil properties generally do not limit range management practices.

The capability classification is IVe-1(4), nonirrigated.

116—Bruhel-Shinglemill complex, 2 to 15 percent slopes

This map unit is on marine terraces. The vegetation is mainly bishop pine and annual and perennial grasses. Elevation ranges from 50 to 300 feet. The average annual precipitation is 40 to 55 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 250 to 330 days.

This unit is about 50 percent Bruhel loam and 25 percent Shinglemill loam. The Bruhel and Shinglemill soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Abalobadiah, Flumeville, and Gibney soils and Tropaquepts. Also included are small areas that have slopes of 15 to 30 percent. Included areas make up about 25 percent of the total acreage of the unit. The percentage varies from one area to another.

The Bruhel soil is deep or very deep to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface layer is dark grayish brown loam about 4 inches thick. The upper 17 inches of the subsoil is grayish brown clay loam. The lower 20 inches is brown gravelly loam and gravelly clay loam. Soft sandstone bedrock is at a depth of about 41 inches.

Permeability is moderate in the Bruhel soil. Available water capacity also is moderate. The effective rooting depth is limited by weathered bedrock at a depth of 40 to 70 inches. Surface runoff is slow or medium, and the hazard of water erosion is slight or moderate if the surface is left bare.

The Shinglemill soil is very deep and is poorly drained. It formed in marine sediments. Typically, the surface is covered with a mat of litter about 2 inches thick. The surface layer is light gray and very pale brown loam about 3 inches thick. The next layer is very pale brown and reddish yellow loam about 5 inches thick. The upper 7 inches of the subsoil is very pale brown loam. The next 10 inches is light yellowish brown clay. The lower part of the subsoil to a depth of 63 inches or more is light yellowish brown, yellow, and brownish yellow clay and sandy clay that have light gray, white, and red mottles. In some areas the surface layer is sandy loam.

Permeability is slow in the Shinglemill soil. Available water capacity is high. The effective rooting depth is limited by saturation for long periods following episodes of heavy rain from December through April. The saturated zone starts between the depths of 12 and 30 inches and extends to a depth of more than 60 inches. Runoff is slow or medium, and the hazard of water erosion is slight or moderate if the surface is left bare.

This unit is used for homesite development, as wildlife habitat, or as watershed. A few areas are used for recreation.

The main limitations affecting homesite development are the slope and low strength and the seasonally saturated soil conditions and slow permeability of the Shinglemill soil. Excavations for roads and buildings increase the hazard of erosion. Revegetating disturbed areas around construction sites as soon as possible helps to control erosion. The design of access roads should control surface runoff and help to stabilize cut slopes. Surface drainage may be needed for roads and buildings. The design of buildings and roads should offset the limited ability of the Shinglemill soil to support a load. The seasonally saturated soil conditions and the restricted permeability of the Shinglemill soil increase the possibility of failure of septic tank absorption fields. Alternative systems may be needed, such as those in which leach lines are placed in a mound above the soil surface.

The capability classification is IIIe-1(4), nonirrigated.

117—Cabrillo-Heeser complex, 0 to 5 percent slopes

This map unit is on marine terraces. The vegetation is mainly perennial grasses and forbs.

Elevation ranges from 20 to 240 feet. The average annual precipitation is 35 to 45 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 250 to 330 days.

This unit is about 50 percent Cabrillo sandy loam and 30 percent Heeser sandy loam. The Cabrillo and Heeser soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Biaggi, Crispin, and Sirdrak soils and Tropaquepts. Also included are small areas that have slopes of 5 to 9 percent. Included areas make up about 20 percent of the total acreage of the unit. The percentage varies from one area to another.

The Cabrillo soil is very deep and is somewhat poorly drained. It formed in marine sediments. Typically, the surface layer is dark grayish brown and dark brown sandy loam about 26 inches thick. The upper 9 inches of the subsoil is very pale brown sandy clay loam that has yellowish brown mottles. The lower 15 inches is light gray sandy clay loam that has strong brown mottles. The substratum to a depth of 60 inches or more is light gray loamy sand that has yellowish red mottles. In some areas the surface layer is very gravelly sandy loam.

Permeability is moderately slow in the Cabrillo soil. Available water capacity is moderate. The effective rooting depth is limited by saturation for brief or long periods following episodes of heavy rain from December through April. The saturated zone starts between the depths of 30 and 48 inches and extends to a depth of more than 60 inches. Surface runoff is very slow or slow, and the hazard of water erosion is slight if the surface is left bare.

The Heeser soil is very deep and is somewhat excessively drained. It formed in eolian sands. Typically, the surface layer is very dark grayish brown and dark brown sandy loam about 34 inches thick. The next layer is brown sandy loam about 12 inches thick. The underlying material to a depth of 65 inches or more is dark yellowish brown sandy loam. In some areas the surface layer is very gravelly sandy loam.

Permeability is moderately rapid in the Heeser soil. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Surface runoff is very slow or slow, and the hazard of water erosion is slight if the surface is left bare.

This unit is used mainly for recreation, homesite development, livestock grazing, hay production, or pasture. A few areas are used for production of bulbs and vegetables.

The main limitations affecting recreational development are the hazards of soil blowing and landsliding at the ocean bluffs. Areas used for recreation can be protected from soil blowing and dust by maintaining a plant cover. The risk of damage from landslides can be minimized by establishing trails, roads, and structures away from the ocean bluffs.

The main limitations affecting homesite development are the moderately slow permeability and the seasonally saturated soil conditions of the Cabrillo soil and the poor filtering capacity in the substratum of the Heeser soil. Sloughing of cutbanks is also a limitation on this unit. The design of access roads should control surface runoff and help to stabilize cut slopes. Surface drainage may be needed for roads and buildings on the Cabrillo soil. The seasonally saturated soil conditions, the slow permeability, and the poor filtering capacity increase the possibility of failure of septic tank absorption fields. Alternative systems may be needed. On the Cabrillo soil, these include systems in which leach lines are placed in a mound above the soil surface. On the Heeser soil, they include systems that increase separation distances from ground water. If the density of housing is moderate or high, community sewage systems may be needed to prevent the contamination of water supplies resulting from seepage.

In areas used for livestock grazing, the potential plant community is mainly bentgrass, common velvetgrass, and sweet vernalgrass. Soil properties generally do not limit range management practices.

If this unit is used for hay production or pasture, the main limitation is the moderately rapid permeability of the Heeser soil. Irrigation water should be applied to this soil in amounts that are sufficient to wet the root zone but small enough to minimize the leaching of plant nutrients. The seasonally saturated soil conditions of the Cabrillo soil reduce the amount of irrigation water needed.

Windbreaks may be desirable on this unit to protect buildings, livestock, and fields from prevailing winds. The main limitations affecting the establishment of windbreaks are the droughtiness of the Heeser soil and the seasonally saturated soil conditions of the Cabrillo soil. Supplemental irrigation may be needed when windbreaks are established on the Heeser soil. Trees and shrubs that are tolerant of saturated soil conditions should be planted on the Cabrillo soil. Among the trees that are suitable for planting on the Heeser soil are eucalyptus, Monterey cypress, Monterey pine, and bishop pine. Eucalyptus and bishop pine are suitable for planting on the Cabrillo soil.

The capability classification is IIIw-2(4), nonirrigated.

118—Carlain loam, 2 to 9 percent slopes

This very deep, well drained soil is on river terraces. It formed in alluvium derived from sandstone. Individual areas are generally long and narrow. The vegetation is mainly redwood, Douglas-fir, and tanoak. Elevation ranges from 50 to 600 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 290 to 365 days.

Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is light brownish gray loam about 5 inches thick. The upper 24 inches of the subsoil is very pale brown loam. The lower part of the subsoil to a depth of 61 inches or more is light brown extremely gravelly clay loam and extremely gravelly loam. In some areas the surface layer is very gravelly loam.

Included with this soil in mapping are small areas of somewhat poorly drained and poorly drained soils and areas of Riverwash. Also included are small areas that have slopes of 9 to 15 percent. Included areas make up about 25 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is moderate in the Carlain soil. Available water capacity is moderate or high. The effective rooting depth is 60 inches or more. Surface runoff is slow or medium, and the hazard of water erosion is slight or moderate if the surface is left bare.

Most areas are used for timber production or wildlife habitat. A few areas are used for recreation.

Redwood, Douglas-fir, and tanoak are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index is 152 for redwood and 183 for Douglas-fir. Site index varies with the amount of coarse fragments in the soil. The potential annual production from a fully stocked stand of redwood is 1,310 board feet per acre.

The main limitation affecting the harvesting of timber is seasonal wetness. Using wheeled and tracked equipment when the soil is moist produces ruts, compacts the surface, and can damage the roots of trees. Disturbance of the protective layer of duff can be minimized by the careful use of either wheeled or tracked equipment. Roads on this unit are dusty when dry. Surface treatment may be desirable during periods of heavy use. Unsurfaced roads and skid trails are slippery when wet and may be impassable during rainy periods. Suitable surfacing of roads is needed for use during wet seasons. Rock for construction of roads generally is available.

Plant competition is a concern affecting the production of timber. When openings are made in the canopy, invading brushy plants that are not controlled can delay the establishment of seedlings. Reforestation can be accomplished by planting redwood or Douglas-fir seedlings. Natural reforestation by redwood sprouts and Douglas-fir seed trees provides variable stocking results. Both overstocked and understocked areas are common.

Among the common forest understory plants are California huckleberry, rhododendron, salal, and swordfern.

The capability classification is IIIe-1(4), nonirrigated.

119—Casabonne-Wohly complex, 9 to 30 percent slopes

This map unit is on hills and mountains. The vegetation is mainly Douglas-fir and tanoak. Elevation ranges from 700 to 4,000 feet. The average annual precipitation is 40 to 70 inches, the average annual air temperature is about 55 degrees F, and the average frost-free period is 150 to 250 days.

This unit is about 45 percent Casabonne loam and 30 percent Wohly loam. The Casabonne and Wohly soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Pardaloe and Woodin soils and small areas of soils that have been altered by skid trails, landings, and roads. Also included are small areas that have slopes of 5 to 9 percent or 30 to 50 percent. Included areas make up about 25 percent of the total acreage of the unit. The percentage varies from one area to another.

The Casabonne soil is deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about $^1/_2$ inch thick. The surface layer is brown loam about 11 inches thick. The upper 25 inches of the subsoil is brown clay loam. The lower 13 inches is reddish yellow clay loam. Hard, fractured sandstone is at a depth of about 49 inches. In some areas the surface layer is gravelly loam.

Permeability is moderate in the Casabonne soil. Available water capacity is moderate or high. The effective rooting depth is limited by bedrock at a

depth of 40 to 60 inches. Surface runoff is medium or rapid, and the hazard of water erosion is moderate if the surface is left bare.

The Wohly soil is moderately deep to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about $^1/_2$ inch thick. The surface layer is pale brown loam about 4 inches thick. The upper 6 inches of the subsoil is light yellowish brown and strong brown loam. The next 16 inches is very pale brown and reddish yellow clay loam. The lower 5 inches of the subsoil is very pale brown gravelly clay loam. Soft, fractured sandstone is at a depth of about 31 inches. In some areas the surface layer is gravelly loam.

Permeability is moderate in the Wohly soil. Available water capacity is low. The effective rooting depth is limited by weathered bedrock at a depth of 20 to 40 inches. Surface runoff is medium or rapid, and the hazard of water erosion is moderate if the surface is left bare.

This unit is used for timber production or as watershed.

Douglas-fir, tanoak, and Pacific madrone are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 153 on the Casabonne soil and 118 on the Wohly soil. The potential annual production from a fully stocked stand of Douglas-fir is 750 board feet per acre on the Casabonne soil and 420 board feet per acre on the Wohly soil.

The main limitation affecting the harvesting of timber is seasonal wetness. Using wheeled and tracked equipment when the soils are wet produces ruts, compacts the surface, and can damage the roots of trees. Disturbance of the protective layer of duff can be minimized by the careful use of wheeled and tracked equipment. Roads on this unit are dusty when dry. Surface treatment may be desirable during periods of heavy use. Unsurfaced roads and skid trails are slippery when wet and may be impassable during rainy periods. Suitable surfacing of roads is needed for use during wet seasons. Rock for construction of roads generally is not available in areas of this unit. Establishing plant cover on steep cut and fill slopes reduces the hazard of surface erosion.

Plant competition is a concern affecting the production of timber. When openings are made in the canopy, invading brushy plants that are not controlled can prevent the establishment of seedlings. Reforestation can be accomplished by planting Douglas-fir and ponderosa pine seedlings. If seed trees are present, natural reforestation of cutover areas by Douglas-fir occurs infrequently. The high soil temperature and low content of soil moisture during the growing season cause a high seedling mortality rate, especially in areas of the Wohly soil on south- and southwest-facing slopes.

Among the common forest understory plants are brackenfern, blue wildrye, and perennial fescues and bromes.

Desirable forage species, such as hardinggrass and soft chess, have grown well in previously wooded areas that have been cleared and seeded. Because these soils have a natural tendency to produce woody species, however, grass is difficult to maintain in most areas.

The capability classification is IVe-1(5), nonirrigated.

120—Casabonne-Wohly complex, 30 to 50 percent slopes

This map unit is on hills and mountains. The vegetation is mainly Douglas-fir and tanoak. Elevation ranges from 700 to 4,000 feet. The average annual precipitation is 40 to 70 inches, the average annual air temperature is about 55 degrees F, and the average frost-free period is 150 to 250 days.

This unit is about 55 percent Casabonne gravelly loam and 30 percent Wohly loam. The Casabonne and Wohly soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Pardaloe and Woodin soils and small areas of soils that have been altered by skid trails, landings, and roads. Also included are small areas that have slopes of 15 to 30 percent or 50 to 75 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

The Casabonne soil is deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about $^1/_2$ inch thick. The surface layer is brown gravelly loam about 11 inches thick. The upper 25 inches of the subsoil is brown clay loam. The lower 13 inches is reddish yellow clay loam. Hard, fractured sandstone is at a depth of about 49 inches. In some areas the surface layer is loam.

Permeability is moderate in the Casabonne soil. Available water capacity is moderate or high. The effective rooting depth is limited by bedrock at a depth of 40 to 60 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

The Wohly soil is moderately deep to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1/2 inch thick. The surface layer is pale brown loam about 4 inches thick. The upper 6 inches of the subsoil is light yellowish brown and strong brown loam. The next 16 inches is very pale brown and reddish yellow clay loam. The lower 5 inches of the subsoil is very pale brown gravelly clay loam. Soft, fractured sandstone is at a depth of about 31 inches. In some areas the surface layer is gravelly loam.

Permeability is moderate in the Wohly soil. Available water capacity is low. The effective rooting depth is limited by weathered bedrock at a depth of 20 to 40 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

This unit is used for timber production or as watershed.

Douglas-fir, tanoak, and Pacific madrone are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 144 on the Casabonne soil and 118 on the Wohly soil. The potential annual production from a fully stocked stand of Douglas-fir is 665 board feet per acre on the Casabonne soil and 420 board feet per acre on the Wohly soil.

The main limitations affecting the harvesting of timber are the slope, the hazard of erosion, and seasonal wetness. Wheeled and tracked equipment can be used in the more gently sloping areas, but cable yarding systems generally cause less disturbance of the soil in the steeper areas. Disturbance of the protective layer of duff can be minimized by the careful use of either wheeled or tracked equipment or cable yarding systems. Unless adequate plant cover or water bars are provided, steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying. Establishing plant cover on steep cut and fill slopes reduces the hazard of erosion. Using wheeled and tracked equipment when the soils are wet produces ruts, compacts the surface, and can damage the roots of trees. Roads on this unit are dusty when dry. Surface treatment may be desirable during periods of heavy use. Unsurfaced roads and skid trails are slippery when wet and may be impassable during rainy periods. Suitable surfacing of roads is needed for use during wet seasons. Rock for construction of roads generally is not available in areas of this unit.

Plant competition is a concern affecting the production of timber. When openings are made in the canopy, invading brushy plants that are not controlled can prevent the establishment of seedlings. Reforestation can be accomplished by planting Douglas-fir and ponderosa pine seedlings. If seed trees are present, natural reforestation of cutover areas by Douglas-fir occurs infrequently. The high soil temperature and low content of soil moisture during the growing season cause a high seedling mortality rate, especially in areas of the Wohly soil on south- and southwest-facing slopes.

Among the common forest understory plants are brackenfern, blue wildrye, and perennial bromes and fescues.

Desirable forage species, such as hardinggrass and soft chess, have grown well in previously wooded areas that have been cleared and seeded. Because these soils have a natural tendency to produce woody species, however, grass is difficult to maintain in most areas.

The capability classification is VIe(5), nonirrigated.

121—Casabonne-Wohly-Pardaloe complex, 50 to 75 percent slopes

This map unit is on hills and mountains. The vegetation is mainly Douglas-fir and tanoak. Elevation ranges from 700 to 4,000 feet. The average annual precipitation is 40 to 70 inches, the average annual air temperature is about 55 degrees F, and the average frost-free period is 150 to 250 days.

This unit is about 35 percent Casabonne gravelly loam, 35 percent Wohly loam, and 15 percent Pardaloe very gravelly loam. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Woodin soils and small areas of soils that have been altered by skid trails, landings, and roads. Also included are small areas that have slopes of 30 to 50 percent or 75 to 99 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

The Casabonne soil is deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1/2 inch thick. The surface layer is brown gravelly loam about 11 inches thick. The upper 25 inches of the subsoil is brown clay loam. The lower 13 inches is reddish yellow clay loam. Hard, fractured sandstone is at a depth of about 49 inches. In some areas the surface layer is loam.

Permeability is moderate in the Casabonne soil. Available water capacity is moderate or high. The effective rooting depth is limited by bedrock at a

depth of 40 to 60 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

The Wohly soil is moderately deep to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1/2 inch thick. The surface layer is pale brown loam about 4 inches thick. The upper 6 inches of the subsoil is light yellowish brown and strong brown loam. The next 16 inches is very pale brown and reddish yellow clay loam. The lower 5 inches of the subsoil is very pale brown gravelly clay loam. Soft, fractured sandstone is at a depth of about 31 inches. In some areas the surface layer is gravelly loam.

Permeability is moderate in the Wohly soil. Available water capacity is low. The effective rooting depth is limited by weathered bedrock at a depth of 20 to 40 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

The Pardaloe soil is deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface layer is pink very gravelly loam about 11 inches thick. The upper 15 inches of the subsoil is very pale brown extremely gravelly sandy loam. The lower 28 inches is brownish yellow and reddish yellow extremely gravelly sandy clay loam. Hard, fractured sandstone is at a depth of about 54 inches. In some areas the surface layer is gravelly sandy loam, gravelly loam, or very gravelly sandy loam.

Permeability is moderate in the Pardaloe soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 40 to 60 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

This unit is used for timber production or as watershed.

Douglas-fir, tanoak, and Pacific madrone are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 144 on the Casabonne soil, 118 on the Wohly soil, and 122 on the Pardaloe soil. The potential annual production from a fully stocked stand of Douglas-fir is 665 board feet per acre on the Casabonne soil, 420 board feet per acre on the Wohly soil, and 455 board feet per acre on the Pardaloe soil.

The main limitations affecting the harvesting of timber on this unit are the slope and the hazard of erosion. Seasonal wetness is also a limitation on the Casabonne and Wohly soils. When timber is harvested, the slope limits the use of wheeled and tracked equipment in skidding operations. Cable yarding systems generally cause less disturbance of the soil. Unless adequate plant cover or water bars are provided, steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying. Harvesting systems that lift logs entirely off the ground minimize the disturbance of the protective layer of duff. Establishing plant cover on steep cut and fill slopes reduces the hazard of surface erosion. Roads may fail and landslides may occur following deep soil disturbance in the steeper areas. Roads are dusty when dry. Surface treatment may be desirable during periods of heavy use. Unsurfaced roads and skid trails are slippery when wet. They may be impassable during rainy periods. Rock for construction of roads generally is not available in areas of this unit.

Plant competition is a concern affecting the production of timber. When openings are made in the canopy, invading brushy plants that are not controlled can prevent the establishment of seedlings. Reforestation can be accomplished by planting Douglas-fir and ponderosa pine seedlings. If seed trees are present, natural reforestation of cutover areas by Douglas-fir occurs infrequently. The high soil temperature and low content of soil moisture during the growing season cause a high seedling mortality rate, especially in areas of the Wohly and Pardaloe soils on south- and southwest-facing slopes.

Among the common forest understory plants are brackenfern, blue wildrye, and perennial bromes and fescues.

The capability classification is VIIe(5), nonirrigated.

122—Caspar sandy loam, 2 to 9 percent slopes

This very deep, well drained soil is on marine terraces. It formed in marine sediments. The vegetation is mainly redwood, Douglas-fir, and bishop pine. Elevation ranges from 200 to 400 feet. The average annual precipitation is 40 to 65 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 290 to 365 days.

Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is dark gray and grayish brown sandy loam about 9 inches thick. The next layer is light yellowish brown sandy loam about 7 inches thick. The upper 21 inches of the subsoil is brownish yellow and

yellowish brown sandy clay loam. The lower 11 inches is yellowish brown sandy clay. The substratum to a depth of 62 inches or more is brownish yellow sandy loam.

Included with this soil in mapping are small areas of Harecreek, Ferncreek, and Quinliven soils, small areas of soils that have moderate cementation in the substratum, and small areas that have slopes of 9 to 15 percent. Included areas make up about 20 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is moderately slow in the Caspar soil. Available water capacity is moderate or high. The effective rooting depth is 60 inches or more. Surface runoff is slow or medium, and the hazard of water erosion is slight or moderate if the surface is left bare.

This unit is used for homesite development or timber production or as watershed.

The main limitation affecting homesite development is sloughing of cutbanks. The design of access roads should control surface runoff and help to stabilize cut slopes.

Redwood, Douglas-fir, bishop pine, and tanoak are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index for redwood is 125. The potential annual production from a fully stocked stand of redwood is 910 board feet per acre. Areas that are subject to strong, persistent winds, which limit tree height, are less productive than other areas. Trees of limited extent include western hemlock, grand fir, and Mendocino cypress.

The main limitations affecting the harvesting of timber are the erosion hazard and seasonal wetness. In areas where it is exposed, the surface layer is subject to sheet and rill erosion. Disturbance of the protective layer of duff can be minimized by the careful use of wheeled and tracked equipment. Establishing plant cover on cut and fill slopes reduces the hazard of erosion. Another limitation is low bearing strength when the soil is saturated. Using wheeled and tracked equipment when the soil is wet produces ruts, compacts the surface, and can damage the roots of trees. Unsurfaced roads and skid trails are slippery and soft when wet. They may be impassable during rainy periods. Suitable surfacing of roads is needed for use during wet seasons. The design of roads should offset the limited ability of the soil to support a load. Roads are dusty when dry. Surface treatment may be desirable during periods of heavy use. Rock for construction of roads generally is not available in areas of this unit.

Plant competition is a concern affecting the production of timber. When openings are made in the canopy, invading brushy plants that are not controlled can delay the establishment of seedlings. The surface layer of this soil has a low capacity to hold nutrients and water. As a result, the establishment of seedlings may be difficult. Reforestation can be accomplished by planting redwood or Douglas-fir seedlings. Natural reforestation by redwood sprouts and Douglas-fir seed trees provides variable stocking results. Both overstocked and understocked areas are common.

Among the common forest understory plants are tanoak, brackenfern, bedstraw, salal, California huckleberry, and swordfern.

The capability classification is IIIe-1(4), nonirrigated.

123—Caspar-Quinliven complex, 30 to 50 percent slopes

This map unit is on shoulders of marine terraces. The vegetation is mainly redwood, Douglas-fir, and bishop pine. Elevation ranges from 100 to 800 feet. The average annual precipitation is 40 to 65 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 290 to 365 days.

This unit is about 50 percent Caspar sandy loam and 35 percent Quinliven sandy loam. The Caspar and Quinliven soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Irmulco, Ferncreek, and Vandamme soils and small areas that have slopes of 15 to 30 percent or 50 to 75 percent. These included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

The Caspar soil is very deep and is well drained. It formed in marine sediments. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is light gray and light yellowish brown sandy loam about 7 inches thick. The upper 21 inches of the subsoil is brownish yellow and yellowish brown sandy clay loam. The lower 11 inches is yellowish brown sandy clay. The substratum to a depth of 62 inches or more is brownish yellow sandy loam.

Permeability is moderately slow in the Caspar soil. Available water capacity is moderate or high. The effective rooting depth is 60 inches or more. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

The Quinliven soil is very deep and is moderately well drained. It formed in marine sediments. Typically,

the surface is covered with a mat of litter about 5 inches thick. The surface layer is light gray sandy loam about 4 inches thick. The next layer is white and very pale brown loam about 7 inches thick. The upper 7 inches of the subsoil is light yellowish brown loam. The next 14 inches is brownish yellow clay. Below this is 19 inches of brownish yellow clay that has red mottles. The lower 9 inches of the subsoil is yellowish red clay loam that has strong brown and light gray mottles. The substratum to a depth of 64 inches or more is yellowish red sandy loam that has strong brown mottles. In some areas the surface layer is loamy sand or loam.

Permeability is slow in the Quinliven soil. Available water capacity is high. The effective rooting depth is limited by saturation between the depths of 48 and 72 inches for brief periods following episodes of heavy rain from December through April. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

This unit is used for timber production or as watershed.

Redwood, Douglas-fir, bishop pine, and tanoak are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index for redwood is 125 on the Caspar soil and 124 on the Quinliven soil. The potential annual production from a fully stocked stand of redwood is 910 board feet per acre on the Caspar soil and 895 board feet per acre on the Quinliven soil. Areas that are subject to strong, persistent winds, which limit tree height, are less productive than other areas of this unit. Trees of limited extent include western hemlock, grand fir, and Mendocino cypress.

The main limitations affecting the harvesting of timber are the slope, the hazard of erosion, and the seasonal wetness. Wheeled and tracked equipment can be used in the more gently sloping areas, but cable yarding systems generally cause less disturbance of the soil in the steeper areas. Disturbance of the protective layer of duff can be minimized by the careful use of either wheeled and tracked equipment or cable yarding systems. Unless adequate plant cover or water bars are provided, steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying. Establishing plant cover on steep cut and fill slopes reduces the hazard of erosion. Another limitation is low bearing strength when the soils are saturated. Using wheeled and tracked equipment when the soils are wet produces ruts, compacts the surface, and can damage the roots of trees. Unsurfaced roads and skid trails are slippery and soft when wet. They may be impassable during rainy periods. Suitable surfacing of roads is needed for use during wet seasons. The design of roads should offset the limited ability of the soils to support a load during wet periods. Roads on this unit are dusty when dry. Surface treatment may be desirable during periods of heavy use. Rock for construction of roads generally is not available in areas of this unit.

Plant competition is a concern affecting the production of timber. When openings are made in the canopy, invading brushy plants that are not controlled can delay the establishment of seedlings. The surface layer of these soils has a low capacity to hold nutrients and water. As a result, the establishment of seedlings may be difficult. Reforestation can be accomplished by planting redwood or Douglas-fir seedlings. Natural reforestation by redwood sprouts and Douglas-fir seed trees provides variable stocking results. Both overstocked and understocked areas are common.

Among the common forest understory plants are tanoak, brackenfern, bedstraw, salal, California huckleberry, and swordfern.

The capability classification is VIe(4), nonirrigated.

124—Caspar-Quinliven-Ferncreek complex, 9 to 30 percent slopes

This map unit is on shoulders of marine terraces. The vegetation is mainly redwood, Douglas-fir, and bishop pine. Elevation ranges from 100 to 1,000 feet. The average annual precipitation is 40 to 65 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 290 to 365 days.

This unit is about 35 percent Caspar sandy loam, 35 percent Quinliven sandy loam, and 15 percent Ferncreek sandy loam. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Harecreek soils. Also included are small areas that have slopes of 5 to 9 percent or 30 to 50 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

The Caspar soil is very deep and is well drained. It formed in marine sediments. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is light gray sandy loam about 9 inches thick. The next layer is light gray and light yellowish brown sandy loam about 7 inches thick. The upper 21 inches of the subsoil is brownish yellow and yellowish brown sandy clay loam. The

lower 11 inches is yellowish brown sandy clay. The substratum to a depth of 62 inches or more is brownish yellow sandy loam.

Permeability is moderately slow in the Caspar soil. Available water capacity is moderate or high. The effective rooting depth is 60 inches or more. Surface runoff is medium or rapid, and the hazard of water erosion is moderate if the surface is left bare.

The Quinliven soil is very deep and is moderately well drained. It formed in marine sediments. Typically, the surface is covered with a mat of litter about 5 inches thick. The surface layer is light gray sandy loam about 4 inches thick. The next layer is white and very pale brown loam about 7 inches thick. The upper 7 inches of the subsoil is light yellowish brown loam. The next 14 inches is brownish yellow clay. The next 19 inches is brownish yellow clay that has red mottles. The lower 9 inches of the subsoil is yellowish red clay loam that has strong brown and light gray mottles. The substratum to a depth of 64 inches or more is yellowish red sandy loam that has strong brown mottles. In some areas the surface layer is loamy sand or loam.

Permeability is slow in the Quinliven soil. Available water capacity is high. The effective rooting depth is limited by saturation between the depths of 48 and 72 inches for brief periods following episodes of heavy rain from December through April. Surface runoff is medium or rapid, and the hazard of water erosion is moderate if the surface is left bare.

The Ferncreek soil is very deep and is somewhat poorly drained. It formed in marine sediments. Typically, the surface is covered with a mat of litter 2 inches thick. The surface layer is gray and white sandy loam about 7 inches thick. The upper 17 inches of the subsoil is very pale brown and light yellowish brown clay loam and clay. The next 9 inches is brownish yellow clay that has reddish yellow and red mottles. The lower 10 inches of the subsoil is brownish yellow sandy clay loam that has red and white mottles. The substratum to a depth of 61 inches or more is yellow sandy loam that has red and white mottles.

Permeability is slow in the Ferncreek soil. Available water capacity is high. The effective rooting depth is limited by saturation for brief or long periods following episodes of heavy rain from December through April. The saturated zone starts between the depths of 24 and 48 inches and extends to a depth of more than 60 inches. Surface runoff is medium or rapid, and the hazard of water erosion is moderate if the surface is left bare.

This unit is used mainly for timber production or as watershed. A few areas are used for homesite development.

Redwood, Douglas-fir, bishop pine, and tanoak are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index for redwood is 125 on the Caspar soil, 124 on the Quinliven soil, and 136 on the Ferncreek soil. The potential annual production from a fully stocked stand of redwood is 910 board feet per acre on the Caspar soil, 895 board feet per acre on the Quinliven soil, and 1,060 board feet per acre on the Ferncreek soil. Areas that are subject to strong, persistent winds, which limit tree heights, are less productive than other areas of this unit. Trees of limited extent include western hemlock, grand fir, and Mendocino cypress.

The main limitations affecting the harvesting of timber are the hazard of erosion and the seasonal wetness. In areas where they are exposed, the soils are subject to sheet and rill erosion. Disturbance of the protective layer of duff can be minimized by the careful use of wheeled and tracked equipment. Establishing plant cover on steep cut and fill slopes reduces the hazard of erosion. Another limitation is low bearing strength when the soils are saturated. Using wheeled and tracked equipment when the soils are wet produces ruts, compacts the surface, and can damage the roots of trees. Unsurfaced roads and skid trails are slippery and soft when wet. They may be impassable during rainy periods. Suitable surfacing of roads is needed for use during wet seasons. The design of roads should offset the limited ability of the soils to support a load. Roads are dusty when dry. Surface treatment may be desirable during periods of heavy use. Rock for construction of roads generally is not available in areas of this unit.

Plant competition is a concern affecting the production of timber. When openings are made in the canopy, invading brushy plants that are not controlled can delay the establishment of seedlings. The surface layer has a low capacity to hold nutrients and water. As a result, the establishment of seedlings may be difficult. Reforestation can be accomplished by planting redwood or Douglas-fir seedlings. Natural reforestation by redwood sprouts and Douglas-fir seed trees provides variable stocking results. Both overstocked and understocked areas are common.

Among the common forest understory plants are tanoak, brackenfern, bedstraw, salal, California huckleberry, and swordfern.

The main limitations affecting homesite development are the slope and the low strength, the seasonally saturated soil conditions, and the

restricted permeability in the subsoil of the Quinliven and Ferncreek soils. The most favorable building sites are in the less sloping areas of this unit. Excavations for roads and buildings increase the hazard of erosion. Revegetating disturbed areas as soon as possible helps to control erosion. The design of access roads should control surface runoff and help to stabilize cut slopes. The design of buildings and roads should offset the limited ability of the Quinliven and Ferncreek soils to support a load. The seasonally saturated soil conditions and the restricted permeability increase the possibility of failure of septic tank absorption fields. The slope is also a concern if septic tank absorption fields are installed. Proper installation procedures can help to overcome the slope.

The capability classification is IVe-1(4), nonirrigated.

125—Cleone loamy sand, 0 to 9 percent slopes

This very deep, somewhat poorly drained soil is on marine terraces. It formed in eolian sands The vegetation is mainly bishop pine and tanoak. Elevation ranges from 100 to 350 feet. The average annual precipitation is 40 to 55 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 290 to 330 days.

Typically, the surface layer is dark gray and gray loamy sand about 3 inches thick. The next 4 inches is light yellowish brown and very pale brown sandy loam that has brownish yellow mottles. The upper 6 inches of the subsoil is pale brown gravelly sandy loam that has brownish yellow mottles. The next 15 inches is very pale brown and light yellowish brown sandy loam that has brownish yellow, dark yellowish brown, and light yellowish brown mottles. The lower 12 inches of the subsoil is light yellowish brown loamy sand. The substratum to a depth of 62 inches or more is very pale brown sand that has light gray and brownish yellow mottles.

Included with this soil in mapping are small areas of Gibney, Harecreek, Shinglemill, and Tregoning soils and Tropaquepts. These soils make up about 25 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is moderately rapid in the Cleone soil. Available water capacity is moderate. The effective rooting depth is limited by saturation for brief or long periods following episodes of heavy rain from December through April. The saturated zone starts between the depths of 30 and 48 inches and extends to a depth of more than 60 inches. Surface runoff is slow or medium, and the hazard of water erosion is slight or moderate if the surface is left bare.

This unit is used for homesite development, as wildlife habitat, or as watershed.

The main limitations affecting homesite development are the seasonally saturated soil conditions and the caving of cutbanks. Surface drainage may be needed for roads and buildings. The design of access roads should control surface runoff and help to stabilize cut slopes. The seasonally saturated soil conditions increase the possibility of failure of septic tank absorption fields. Alternative systems may be needed.

The capability classification is IVe-4(4), nonirrigated.

126—Coastal beaches

This map unit consists of sandy, gravelly, or cobbly coastal shores. It is in areas that have been washed and rewashed by wave and tidal action. These areas may be partly covered with water during high tides or stormy periods. Some areas include outcrops of resistant bedrock surrounded by beach sand, and some areas are littered with debris washed ashore during storms. Coastal beaches support little or no vegetation, have no agricultural value, and are not suitable for the development of building sites or roads. They are very valuable for recreational uses, as habitat for coastal wildlife, and for esthetic purposes.

The capability classification is VIII(4), nonirrigated.

127—Cole loam, 0 to 5 percent slopes

This very deep, somewhat poorly drained soil is on river terraces. It formed in alluvium derived from mixed rock sources. The vegetation is mainly annual grasses and forbs. Elevation ranges from 175 to 1,750 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is about 55 degrees F, and the average frost-free period is 150 to 250 days.

Typically, the surface layer is dark grayish brown loam about 18 inches thick. The next layer is grayish brown clay loam about 12 inches thick. The subsoil to a depth of 60 inches or more is grayish brown clay loam that has strong brown mottles. In some areas the surface layer is clay loam.

Included with this soil in mapping are small areas of Boontling soils. These soils make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is slow in the Cole soil. Available water capacity is high. The effective rooting depth is limited by saturation for brief or long periods following episodes of heavy rain from November through May. The saturated zone starts between the depths of 30 and 42 inches and extends to a depth of more than 60 inches. Surface runoff is slow, and the hazard of water erosion is slight if the surface is left bare.

This unit is used for homesite development, hay production, or pasture.

The main limitations affecting homesite development are low strength, a high shrink-swell potential, the seasonally saturated soil conditions, and the slow permeability in the subsoil. The design of buildings and roads should offset the effects of shrinking and swelling and the limited ability of the soil to support a load. Surface drainage may be needed for roads and buildings. The saturated soil conditions and the restricted permeability in the subsoil increase the possibility of failure of septic tank absorption fields. Alternative systems may be needed, such as those in which leach lines are placed in a mound above the soil surface.

If this unit is used for hay production or pasture, the main limitation is the restricted permeability. The application of irrigation water should be regulated so that adequate infiltration is possible. The seasonally saturated soil conditions reduce the amount of irrigation water needed.

The capability classification is IIIw-3(14), nonirrigated, and IIw-3(14), irrigated.

128—Cole loam, drained, 0 to 2 percent slopes

This very deep soil is on river terraces. It formed in alluvium derived from mixed rock sources. Under natural conditions, it is somewhat poorly drained; but the water table has been lowered by artificial drainage or stream entrenchment. The vegetation is mainly annual grasses and forbs and scattered oaks. Elevation ranges from 1,600 to 1,750 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is about 55 degrees F, and the average frost-free period is 150 to 250 days.

Typically, the surface layer is dark grayish brown loam about 18 inches thick. The next layer is grayish brown clay loam about 12 inches thick. The subsoil to a depth of 60 inches or more is grayish brown clay loam. In some areas the surface layer is clay loam.

Included with this soil in mapping are small areas of poorly drained soils. These soils make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is slow in the Cole soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Surface runoff is slow, and the hazard of water erosion is slight if the surface is left bare.

This unit is used for homesite development, hay production, or pasture.

The main limitations affecting homesite development are low strength, a high shrink-swell potential, and the slow permeability. The design of buildings and roads should offset the effects of shrinking and swelling and the limited ability of the soil to support a load. Surface drainage is needed for roads and buildings. The restricted permeability increases the possibility of failure of septic tank absorption fields. Enlarging the absorption field and using low-volume flush toilets can help to overcome this limitation.

If this unit is used for hay production or pasture, the main limitation is the restricted permeability. The application of irrigation water should be regulated so that adequate infiltration is possible.

The capability classification is IIIs-3(14), nonirrigated, and IIs-3(14), irrigated.

129—Comptche-Zeni complex, 30 to 50 percent slopes

This map unit is on hills and mountains. The vegetation is mainly Douglas-fir and redwood. Elevation ranges from 200 to 2,000 feet. The average annual precipitation is 50 to 70 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 220 to 320 days.

This unit is about 50 percent Comptche gravelly loam and 30 percent Zeni loam. The Comptche and Zeni soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Ornbaun soils and small areas of soils that have been altered by skid trails, landings, and roads. Also included are small areas that have slopes of 15 to 30 percent or 50 to 75 percent. Included areas make up about 20 percent of the total acreage of the unit. The percentage varies from one area to another.

The Comptche soil is deep or very deep to bedrock and is well drained. It formed in material derived from metamorphosed basalt. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is dark reddish

gray gravelly loam about 6 inches thick. The upper 25 inches of the subsoil is dark reddish gray and reddish brown gravelly clay loam. The lower 38 inches is reddish brown gravelly clay and very gravelly clay. Hard, fractured metamorphosed basalt is at a depth of about 69 inches. In some areas the surface layer is loam.

Permeability is moderately slow in the Comptche soil. Available water capacity is moderate. The effective rooting depth is limited by bedrock at a depth of 40 to 70 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

The Zeni soil is moderately deep to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is pale brown loam about 4 inches thick. The subsoil is yellow and light brown loam about 26 inches thick. Soft, fractured sandstone is at a depth of about 30 inches.

Permeability is moderate in the Zeni soil. Available water capacity is low or moderate. The effective rooting depth is limited by weathered bedrock at a depth of 20 to 40 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

This unit is used for timber production or as watershed. The Comptche soil is also used as a source of hard rock.

Tanoak, Douglas-fir, redwood, and Pacific madrone are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 122 on the Comptche soil and 129 on the Zeni soil. On the basis of a 100-year site curve, the mean site index for redwood is 135 on the Comptche soil and 130 on the Zeni soil. The potential annual production from a fully stocked stand of redwood is 1,045 board feet per acre on the Comptche soil and 980 board feet per acre on the Zeni soil.

The main limitations affecting the harvesting of timber are the slope, the hazard of erosion, and seasonal wetness. Wheeled and tracked equipment can be used in the more gently sloping areas, but cable yarding systems generally cause less disturbance of the soil in the steeper areas. Disturbance of the protective layer of duff can be minimized by the careful use of either wheeled and tracked equipment or cable yarding systems. Unless adequate plant cover or water bars are provided, steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying. Establishing plant cover on steep cut and fill slopes reduces the hazard of surface erosion. Using wheeled and tracked equipment when the soils are wet produces ruts, compacts the surface, and can damage the roots of trees. Roads on this unit are dusty when dry. Surface treatment may be desirable during heavy use. Unsurfaced roads and skid trails are slippery when wet. They may be impassable during rainy periods. Suitable surfacing of roads is needed for use during wet seasons. Rock for construction of roads generally is available in areas of this unit.

Plant competition is a concern affecting the production of timber. When openings are made in the canopy, invading brushy plants that are not controlled can delay the establishment of seedlings. Reforestation can be accomplished by planting redwood and Douglas-fir seedlings. If seed trees are present, natural reforestation of cutover areas by Douglas-fir occurs infrequently. Redwood can regenerate by sprouting after cutting. These sprouts seldom provide optimum stocking.

Among the common forest understory plants are starflower, vanillaleaf, and iris.

The capability classification is VIe(4), nonirrigated.

130—Comptche-Zeni complex, 50 to 75 percent slopes

This map unit is on hills and mountains. The vegetation is mainly Douglas-fir and redwood. Elevation ranges from 200 to 2,000 feet. The average annual precipitation is 50 to 70 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 220 to 320 days.

This unit is about 50 percent Comptche gravelly loam and 30 percent Zeni loam. The Comptche and Zeni soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Ornbaun soils and soils that have been altered by skid trails, landings, and roads. Also included are small areas that have slopes of 30 to 50 percent or 75 to 99 percent. Included areas make up about 20 percent of the total acreage of the unit. The percentage varies from one area to another.

The Comptche soil is deep or very deep to bedrock and is well drained. It formed in material derived from metamorphosed basalt. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is dark reddish gray gravelly loam about 6 inches thick. The upper 25 inches of the subsoil is dark reddish gray and reddish brown gravelly clay loam. The lower 38 inches is

reddish brown gravelly clay and very gravelly clay. Hard, fractured metamorphosed basalt is at a depth of about 69 inches. In some areas the surface layer is loam.

Permeability is moderately slow in the Comptche soil. Available water capacity is moderate. The effective rooting depth is limited by bedrock at a depth of 40 to 70 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

The Zeni soil is moderately deep to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is pale brown loam about 4 inches thick. The subsoil is yellow and light brown loam about 26 inches thick. Soft, fractured sandstone is at a depth of about 30 inches.

Permeability is moderate in the Zeni soil. Available water capacity is low or moderate. The effective rooting depth is limited by weathered bedrock at a depth of 20 to 40 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

This unit is used for timber production or as watershed. The Comptche soil is also used as a source of hard rock.

Tanoak, Douglas-fir, redwood, and Pacific madrone are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 122 on the Comptche soil and 129 on the Zeni soil. On the basis of a 100-year site curve, the mean site index for redwood is 135 on the Comptche soil and 130 on the Zeni soil. The potential annual production from a fully stocked stand of redwood is 1,045 board feet per acre on the Comptche soil and 980 board feet per acre on the Zeni soil.

The main limitations affecting the harvesting of timber are the slope, the hazard of erosion, and seasonal wetness. When timber is harvested, the slope limits the use of wheeled and tracked equipment in skidding operations. Cable yarding systems generally cause less disturbance of the soil. Unless adequate plant cover or water bars are provided, steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying. Harvesting systems that lift logs entirely off the ground minimize the disturbance of the protective layer of duff. Establishing plant cover on steep cut and fill slopes reduces the hazard of surface erosion. Roads may fail and landslides may occur following deep soil disturbance in the steeper areas. Roads are dusty when dry. Surface treatment may be desirable during periods of heavy use. Unsurfaced roads and skid trails are slippery when wet. They may be impassable during rainy periods. Suitable surfacing of roads is needed for use during wet seasons. Rock for construction of roads generally is available in areas of this unit.

Plant competition is a concern affecting the production of timber. When openings are made in the canopy, invading brushy plants that are not controlled can delay the establishment of seedlings. Reforestation can be accomplished by planting Douglas-fir and redwood seedlings. If seed trees are present, natural reforestation of cutover areas by Douglas-fir occurs infrequently. After it is cut, redwood can regenerate by sprouting. These sprouts seldom provide optimum stocking.

Among the common forest understory plants are starflower, vanillaleaf, and iris.

The capability classification is VIIe(4), nonirrigated.

131—Cottoneva loam, 0 to 2 percent slopes

This very deep, somewhat poorly drained soil is on flood plains. It formed in alluvium derived from sandstone. The vegetation is mainly red alder and willow, but some areas support annual and perennial grasses. Elevation ranges from 0 to 200 feet. The average annual precipitation is 40 to 50 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 290 to 365 days.

Typically, the surface layer is pale brown and light yellowish brown loam about 12 inches thick. The upper 36 inches of the underlying material is light yellowish brown and pale brown, stratified sandy loam and loam. Below this to a depth of 63 inches or more is pale brown and greenish gray, stratified sandy clay loam and clay loam that have light gray, light yellowish brown, and brownish yellow mottles. In some areas the surface layer is sandy loam.

Included with this soil in mapping are small areas of Bigriver soils and areas of Riverwash. These included areas make up about 10 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is moderately slow in the Cottoneva soil. Available water capacity is high. The effective rooting depth is limited by saturation for long periods following episodes of heavy rain from December through April. The saturated zone starts between the depths of 30 and 48 inches and extends to a depth of

more than 60 inches. Surface runoff is ponded or very slow, and the hazard of water erosion is slight if the surface is left bare. This soil is frequently flooded for brief periods from December through April.

This unit is used mainly for hay production, pasture, or wildlife habitat. It is also used for firewood production.

If this unit is used for hay production or pasture, the main limitation is the flooding. Grazing should be deferred when the surface layer is saturated. The seasonally saturated soil conditions reduce the amount of irrigation water needed.

This unit is poorly suited to the production of timber. Red alder and willow are the main tree species. On the basis of an 80-year site curve, the mean site index for red alder is 92.

The main limitation affecting the harvesting of firewood is the seasonal wetness. The seasonally saturated soil conditions and ponding limit the use of equipment to dry periods in summer. Unsurfaced roads and skid trails are soft when wet. They may be impassable during rainy periods. Suitable surfacing of roads is needed for use during wet seasons. Rock for construction of roads generally is not available in areas of this unit.

Plant competition and seedling establishment are concerns affecting the production of firewood. When openings are made in the canopy, invading brush and herbaceous plants that are not controlled can delay the establishment of seedlings. A high water table and the ponding hinder root respiration, which results in a low seedling survival rate. If seed trees are present, natural reforestation of cutover areas by red alder occurs frequently. Because the rooting depth is restricted by the high water table, trees are occasionally subject to windthrow.

Among the common forest understory plants are nettle, checker, oxalis, swordfern, and salmonberry.

The capability classification is IVw-2(4), nonirrigated.

132—Crispin loam, 0 to 5 percent slopes

This well drained soil is moderately deep to a hardpan. It is on marine terraces. It formed in alluvium derived from mixed rock sources. The vegetation is mainly perennial grasses and forbs. Elevation ranges from 20 to 240 feet. The average annual precipitation is 35 to 45 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 250 to 330 days.

Typically, the surface layer is dark brown loam about 14 inches thick. The subsoil is brown loam about 9 inches thick. Below this to a depth of 62 inches or more is a weakly cemented hardpan.

Included with this soil in mapping are small areas of Cabrillo, Biaggi, Flumeville, Mallopass, and Windyhollow soils. Also included are small areas that have slopes of 5 to 9 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is slow in the Crispin soil. Available water capacity is low. The effective rooting depth is limited by a hardpan at a depth of 20 to 40 inches. Surface runoff is very slow or slow, and the hazard of water erosion is slight if the surface is left bare.

This unit is used for livestock grazing, hay production, pasture, or wildlife habitat.

In areas used for livestock grazing, the potential plant community is mainly bentgrass, common velvetgrass, and sweet vernalgrass. Soil properties generally do not limit range management practices.

Few limitations affect the use of this soil for hay production or pasture.

Windbreaks may be desirable on this unit to protect buildings, livestock, and fields from prevailing winds. Few limitations affect the establishment of windbreaks. Supplemental irrigation may be needed when windbreaks are established and during dry periods. Among the trees that are suitable for planting are eucalyptus, Monterey cypress, Monterey pine, and bishop pine.

The capability classification is IIIe-3(4), irrigated and nonirrigated.

133—Dann-Hiltabidel complex, 30 to 50 percent slopes

This map unit is on mountains. The vegetation is mainly conifers and brush. Elevation ranges from 2,500 to 4,100 feet. The average annual precipitation is 60 to 70 inches, the average annual air temperature is about 55 degrees F, and the average frost-free period is 150 to 250 days.

This unit is about 75 percent Dann very cobbly clay loam and 15 percent Hiltabidel very stony clay loam. The Dann and Hiltabidel soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Littlered soils and areas of Rock outcrop. Also included are small areas that have slopes of 15 to 30 percent or 50 to 75 percent. Included areas make up about 10 percent of the total acreage of the unit. The percentage varies from one area to another.

The Dann soil is moderately deep to bedrock and

is well drained. It formed in material derived from ultramafic intrusive rocks. Typically, the surface layer is reddish brown very cobbly clay loam about 5 inches thick. The subsoil is strong brown extremely stony clay loam about 26 inches thick. Hard, fractured peridotite is at a depth of about 31 inches. In some areas the surface layer is cobbly loam or cobbly clay loam.

Permeability is moderately slow in the Dann soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

The Hiltabidel soil is very shallow or shallow to bedrock and is well drained. It formed in material derived from ultrabasic intrusive rocks. Typically, the surface is covered with a mat of leaves and twigs about 1/2 inch thick. The surface layer is reddish brown very stony clay loam about 13 inches thick. The next layer is reddish brown extremely stony clay loam about 4 inches thick. Hard, fractured peridotite is at a depth of about 17 inches. In some areas the surface layer is extremely stony clay loam.

Permeability is moderate in the Hiltabidel soil. Available water capacity is very low. The effective rooting depth is limited by bedrock at a depth of 6 to 20 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

This unit is used as wildlife habitat or as watershed. These soils have a chemical imbalance because of a low calcium-to-magnesium ratio. This imbalance restricts the growth of conifers.

The capability classification is VIIs(5), nonirrigated.

134—Dann-Littlered-Hiltabidel complex, 5 to 30 percent slopes

This map unit is on mountains. The vegetation is mainly conifers and brush. Elevation ranges from 2,000 to 4,100 feet. The average annual precipitation is 60 to 70 inches, the average annual air temperature is about 55 degrees F, and the average frost-free period is 150 to 250 days.

This unit is about 60 percent Dann very cobbly clay loam, 15 percent Littlered clay loam, and 15 percent Hiltabidel very stony clay loam. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Rock outcrop and small areas that have slopes of more than 30 to 50 percent. Included areas make up about 10 percent of the total acreage of the unit. The percentage varies from one area to another.

The Dann soil is moderately deep to bedrock and is well drained. It formed in material derived from ultramafic intrusive rocks. The surface layer is reddish brown very cobbly clay loam about 5 inches thick. The subsoil is strong brown extremely stony clay loam about 26 inches thick. Hard, fractured peridotite is at a depth of about 31 inches. In some areas the surface layer is cobbly loam or cobbly clay loam.

Permeability is moderately slow in the Dann soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is medium or rapid, and the hazard of water erosion is slight or moderate if the surface is left bare.

The Littlered soil is very deep and is well drained. It formed in material derived from ultrabasic intrusive rocks. Typically, the surface is covered with a mat of leaves and twigs about 1/2 inch thick. The surface layer is dark red clay loam about 10 inches thick. The subsoil is yellowish red clay loam about 16 inches thick. The substratum to a depth of 65 inches or more is strong brown loam.

Permeability is moderate in the Littlered soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Surface runoff is medium or rapid, and the hazard of water erosion is slight or moderate if the surface is left bare.

The Hiltabidel soil is very shallow or shallow to bedrock and is well drained. It formed in material derived from ultramafic intrusive rocks. Typically, the surface is covered with a mat of leaves and twigs about 1/2 inch thick. The surface layer is reddish brown very stony clay loam about 13 inches thick. The next layer is reddish brown extremely stony clay loam about 4 inches thick. Hard, fractured peridotite is at a depth of about 17 inches. In some areas the surface layer is extremely stony clay loam.

Permeability is moderate in the Hiltabidel soil. Available water capacity is very low. The effective rooting depth is limited by bedrock at a depth of 6 to 20 inches. Surface runoff is medium or rapid, and the hazard of water erosion is slight or moderate if the surface is left bare.

This unit is used as wildlife habitat or as watershed. These soils have a chemical imbalance because of a low calcium-to-magnesium ratio. This imbalance restricts the growth of conifers.

The capability classification is VIIs(5), nonirrigated.

135—Dehaven-Hotel complex, 50 to 75 percent slopes

This map unit is on hills. The vegetation is mainly redwood and Douglas-fir. Elevation ranges from 10 to 800 feet. The average annual precipitation is 40 to 70 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 290 to 365 days.

This unit is about 45 percent Dehaven gravelly loam and 35 percent Hotel very gravelly loam. The Dehaven and Hotel soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Tramway and Irmulco soils and small areas of shallow soils. Also included are small areas of soils that have been altered by skid trails, landings, and roads and small areas that have slopes of 30 to 50 percent or 75 to 99 percent. Included areas make up about 20 percent of the total acreage of the unit. The percentage varies from one area to another.

The Dehaven soil is deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 2 inches thick. The surface layer is brown and pale brown gravelly loam about 17 inches thick. The upper 17 inches of the subsoil is brownish yellow very gravelly sandy clay loam. The lower 18 inches is brownish yellow extremely gravelly sandy clay loam. Hard, fractured sandstone is a depth of about 52 inches.

Permeability is moderate in the Dehaven soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 40 to 60 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

The Hotel soil is moderately deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 2 inches thick. The surface layer is brown very gravelly loam about 8 inches thick. The subsoil is light yellowish brown and very pale brown very gravelly clay loam about 27 inches thick. Hard, fractured sandstone is at a depth of about 35 inches. In some areas the surface layer is gravelly loam.

Permeability is moderate in the Hotel soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

This unit is used for timber production or as watershed.

Redwood and Douglas-fir are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index for redwood is 153 on the Dehaven soil and 123 on the Hotel soil. The potential annual production from a fully stocked stand of redwood is 1,325 board feet per acre on the Dehaven soil and 880 board feet per acre on the Hotel soil. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 183 on the Dehaven soil and 156 on the Hotel soil. Trees of limited extent include grand fir, tanoak, and canyon live oak.

The main limitations affecting the harvesting of timber are the slope and the hazard of erosion. When timber is harvested, the slope limits the use of wheeled and tracked equipment in skidding operations. Cable yarding systems generally cause less disturbance of the soil. Revegetation of exposed subsoil is difficult on this unit; however, it generally is not needed for control of surface erosion because of the large amount of coarse fragments. Roads may fail and landslides may occur following deep soil disturbance in the steeper areas. Rock for construction of roads generally is available in areas of this unit. Rocks and loose soil material may slide onto roads. This hazard increases the need for road maintenance.

Plant competition is a concern affecting the production of timber. When openings are made in the canopy, invading brushy plants that are not controlled can delay the establishment of seedlings. Reforestation can be accomplished by planting redwood and Douglas-fir seedlings. Natural reforestation by redwood sprouts and Douglas-fir seed trees provides variable stocking results. Both overstocked and understocked areas are common. Movement of loose surface material can reduce seedling survival rates in the steeper areas.

Among the common forest understory plants are oxalis, swordfern, and salal.

The capability classification is VIIe(4), nonirrigated.

136—Dehaven-Hotel complex, 75 to 99 percent slopes

This map unit is on extremely steep hills. The vegetation is mainly redwood and Douglas-fir. Elevation ranges from 10 to 800 feet. The average annual precipitation is 40 to 70 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 290 to 365 days.

This unit is about 40 percent Dehaven gravelly loam and 40 percent Hotel very gravelly loam. The Dehaven and Hotel soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Rock outcrop and small areas of shallow soils. Also included are small areas that have slopes of 50 to 75 percent. Included areas make up about 20 percent of the total acreage of the unit. The percentage varies from one area to another.

The Dehaven soil is deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 2 inches thick. The surface layer is brown and pale brown gravelly loam about 17 inches thick. The upper 17 inches of the subsoil is brownish yellow very gravelly sandy clay loam. The lower 18 inches is brownish yellow extremely gravelly sandy clay loam. Hard, fractured sandstone is at a depth of about 52 inches.

Permeability is moderate in the Dehaven soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 40 to 60 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

The Hotel soil is moderately deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 2 inches thick. The surface layer is brown very gravelly loam about 8 inches thick. The subsoil is light yellowish brown and very pale brown very gravelly clay loam about 27 inches thick. Hard, fractured sandstone is at a depth of about 35 inches. In some areas the surface layer is gravelly loam.

Permeability is moderate in the Hotel soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

This unit is used for timber production or as watershed.

Redwood and Douglas-fir are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index for redwood is 153 on the Dehaven soil and 123 on the Hotel soil. The potential annual production from a fully stocked stand of redwood is 1,325 board feet per acre on the Dehaven soil and 880 board feet per acre on the Hotel soil. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 183 on the Dehaven soil and 156 on the Hotel soil. Trees of limited extent include tanoak, grand fir, and canyon live oak.

The main limitations affecting the harvesting of timber are the slope and the hazard of erosion. Cable yarding systems generally are used on this unit. Harvesting systems that lift logs entirely off the ground minimize the disturbance of the protective layer of duff. Revegetation of exposed subsoil is difficult on this unit; however, it generally is not needed for control of surface erosion because of the large amount of coarse fragments. Roads may fail and landslides may occur following deep soil disturbance. Rock for construction of roads is generally available in areas of this unit. Rocks and loose soil material frequently slide onto roads. This hazard increases the need for road maintenance.

Seedling establishment is a concern affecting the production of timber. Reforestation can be accomplished by planting redwood and Douglas-fir seedlings. Natural reforestation by redwood sprouts and Douglas-fir seed trees provides variable stocking results. Both overstocked and understocked areas are common. Movement of loose surface material can reduce the seedling survival rate.

Among the common forest understory plants are oxalis, swordfern, and salal.

The capability classification is VIIe(4), nonirrigated.

137—Dehaven-Hotel-Irmulco complex, 30 to 50 percent slopes

This map unit is on steep hills. The vegetation is mainly redwood and Douglas-fir. Elevation ranges from 10 to 800 feet. The average annual precipitation is 40 to 70 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 290 to 365 days.

This unit is about 40 percent Dehaven gravelly loam, 20 percent Hotel very gravelly loam, and 20 percent Irmulco loam. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Tramway soils and small areas of soils that have been altered by skid trails, landings, and roads. Also included are small areas that have slopes of 15 to 30 percent or 50 to 70 percent. Included areas make up about 20 percent of the total acreage of the unit. The percentage varies from one area to another.

The Dehaven soil is deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves

and twigs about 2 inches thick. The surface layer is brown and pale brown gravelly loam about 17 inches thick. The upper 17 inches of the subsoil is brownish yellow very gravelly sandy clay loam. The lower 18 inches is brownish yellow extremely gravelly sandy clay loam. Hard, fractured sandstone is at a depth of about 52 inches.

Permeability is moderate in the Dehaven soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 40 to 60 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

The Hotel soil is moderately deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 2 inches thick. The surface layer is brown very gravelly loam about 8 inches thick. The subsoil is light yellowish brown and very pale brown very gravelly clay loam about 27 inches thick. Hard, fractured sandstone is at a depth of about 35 inches. In some areas the surface layer is gravelly loam.

Permeability is moderate in the Hotel soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

The Irmulco soil is very deep and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is pale brown loam about 6 inches thick. The upper 35 inches of the subsoil is light brown loam. The lower 20 inches is light brown, pink, and reddish yellow clay loam. Soft sandstone bedrock is at a depth of about 61 inches.

Permeability is moderate in the Irmulco soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

This unit is used for timber production or as watershed.

Redwood and Douglas-fir are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index for redwood is 153 on the Dehaven soil, 123 on the Hotel soil, and 165 on the Irmulco soil. The potential annual production from a fully stocked stand of redwood is 1,325 board feet per acre on the Dehaven soil, 880 board feet per acre on the Hotel soil, and 1,545 board feet per acre on the Irmulco soil. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 183 on the Dehaven soil, 156 on the Hotel soil, and 191 on the Irmulco soil. Trees of limited extent include tanoak, grand fir, and canyon live oak.

The main limitations affecting the harvesting of timber are the slope and the hazard of erosion, especially in areas of the Irmulco soil. Wheeled and tracked equipment can be used in the more gently sloping areas, but cable yarding systems generally cause less disturbance of the soil in the steeper areas. Disturbance of the protective layer of duff can be minimized by the careful use of either wheeled and tracked equipment or cable yarding systems. Unless adequate plant cover or water bars are provided, steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying. Revegetation of exposed subsoil is difficult on the Dehaven and Hotel soils; however, it generally is not needed for control of surface erosion because of the large amount of coarse fragments. Establishing plant cover on steep cut and fill slopes reduces the hazard of erosion on the Irmulco soil. Rock for construction of roads generally is available in areas of this unit.

Plant competition is a concern affecting the production of timber, especially in areas of the Irmulco soil. When openings are made in the canopy, invading brushy plants that are not controlled can delay the establishment of seedlings. Reforestation can be accomplished by planting redwood and Douglas-fir seedlings. Natural reforestation by redwood sprouts and Douglas-fir seed trees provides variable stocking results. Both overstocked and understocked areas are common.

Among the common forest understory plants are oxalis, swordfern (fig. 4), and salal.

The capability classification is VIe(4), nonirrigated.

138—Duneland

Duneland consists of mounds and hills of loose sand blown from nearby beaches. Areas of this map unit are along the coast of the Pacific Ocean from the mouth of the Ten Mile River south to Mackerricher State Park and at Manchester Beach State Park. Elevation ranges from sea level to 150 feet. Most areas are active and shifting, but other areas have been partially stabilized by sagebrush and grasses.

Duneland exhibits no soil profile development. Permeability of the loose sand is very rapid. Available water capacity is low. The effective rooting depth is 60 inches or more.

Included in mapping are small areas of Sirdrak soils and Tropaquepts.

This unit is used for recreation or as wildlife habitat.

Figure 4.—A lush swordfern understory is common on the redwood-producing soils near the coast. Cool, moist marine air helps to preserve soil moisture well into the summer. Pictured is an area of Dehaven-Hotel-Irmulco complex, 30 to 50 percent slopes.

Plant cover helps to stabilize the dunes and prevent further movement.

The capability classification is VIII(4), nonirrigated.

139—Dystropepts, 30 to 75 percent slopes

This unit consists of soils on side slopes of marine terraces. These soils formed in material derived from sandstone or shale. The vegetation is mainly brush or grass and grand fir, Douglas-fir, and redwood. The redwood is in areas protected from salt spray. Elevation ranges from 10 to 400 feet. The average annual precipitation is 35 to 45 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 250 to 330 days.

Dystropepts are shallow or moderately deep to bedrock and are well drained. A representative profile has a surface layer of dark grayish brown loam about 11 inches thick. The next layer is dark grayish brown very gravelly clay loam about 8 inches thick. Hard and soft, fractured shale is at a depth of about 19 inches.

Included in mapping are small areas of Abalobadiah and Vizcaino soils, areas of Rock outcrop, and areas of mass wasting along ocean bluffs. Also included are small areas that have slopes of 15 to 30 percent or 75 to 99 percent. Included areas make up about 25 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability and available water capacity are extremely variable in the Dystropepts. The effective rooting depth is limited by bedrock at a depth of 10 to 40 inches. Surface runoff is rapid or very rapid, and the hazard of water erosion is severe or very severe.

This unit is used as watershed or wildlife habitat.

The capability classification is VIIe(4), nonirrigated.

140—Feliz loam, 0 to 5 percent slopes

This very deep, well drained soil is on river terraces. It formed in alluvium derived from mixed rock sources. The vegetation in areas that are not cultivated is mainly annual grasses and forbs. Elevation ranges from 160 to 1,750 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is about 55 degrees F, and the average frost-free period is 175 to 250 days.

Typically, the surface layer is brown loam about 27 inches thick. The upper 16 inches of the underlying material is pale brown loam. Below this to a depth of about 60 inches is dark yellowish brown clay loam. In some areas the surface texture is sandy loam or loamy sand.

Included with this soil in mapping are small areas of Talmage soils and areas of Riverwash. Also included are small areas that have slopes of 5 to 9 percent. Included areas make up about 20 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is moderate in the Feliz soil. Available water capacity is very high. The effective rooting depth is 60 inches or more. Surface runoff is slow, and the hazard of water erosion is slight if the surface is left bare. Some areas are subject to very brief periods of rare flooding from December through April.

This unit is used mainly for production of wine grapes and apples. A few areas are used for vegetable production, hay production, or pasture.

Few limitations affect the use of this soil for the production of wine grapes and apples. Managing cover crops by mowing instead of tillage helps to control erosion and reduces energy consumption.

Irrigation is needed to establish grapes. Sprinkler and trickle irrigation methods are suitable for vineyards. These methods permit the even, controlled application of water, minimize runoff, and reduce the hazard of erosion. Wine grape production is estimated at 4 to 5 tons per acre. Apple production is estimated at 15 to 20 tons per acre.

The capability classification is IIIe-1(14), nonirrigated, and IIe-1(14), irrigated.

141—Ferncreek sandy loam, 2 to 9 percent slopes

This very deep, somewhat poorly drained soil is on marine terraces. It formed in marine sediments. The vegetation is mainly redwood, bishop pine, and Douglas-fir. Elevation ranges from 100 to 800 feet. The average annual precipitation is 40 to 65 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 290 to 365 days.

Typically, the surface is covered with a mat of litter 2 inches thick. The surface layer is light gray, gray, and white sandy loam about 7 inches thick. The upper 17 inches of the subsoil is very pale brown and light yellowish brown clay loam and clay. The next 9 inches is brownish yellow clay that has reddish yellow and red mottles. Below this, from a depth of 33 to 43 inches, is brownish yellow sandy clay loam that has red and white mottles. The lower part of the subsoil to a depth of 61 inches or more is yellow sandy loam

that has red and white mottles. In some areas the surface layer is loam.

Included with this soil in mapping are small areas of Caspar and Quinliven soils. Also included are small areas that have slopes of 9 to 15 percent. Included areas make up about 20 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is slow in the Ferncreek soil. Available water capacity is high. The effective rooting depth is limited by saturation for brief or long periods following episodes of heavy rain from December through April. The saturated zone starts between the depths of 24 and 48 inches and extends to a depth of more than 60 inches. Surface runoff is slow or medium, and the hazard of water erosion is slight or moderate if the surface is left bare.

This unit is used for timber production, homesite development, or watershed.

Redwood, Douglas-fir, bishop pine, and tanoak are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index is 136 for redwood and 159 for Douglas-fir. The potential annual production from a fully stocked stand of redwood is 1,060 board feet per acre. Areas that are subject to strong, persistent winds, which limit tree height, are less productive than other areas of the unit. Trees of limited extent include western hemlock, grand fir, and Mendocino cypress.

The main limitation affecting the harvesting of timber is the seasonal wetness. Disturbance of the protective layer of duff can be minimized by the careful use of wheeled and tracked equipment. Establishing plant cover on cut and fill slopes reduces the hazard of erosion. Another limitation is low bearing strength when the soil is saturated. Using wheeled and tracked equipment when the soil is wet produces ruts, compacts the surface, and can damage the roots of trees. Unsurfaced roads and skid trails are slippery and soft when wet. They may be impassable during rainy periods. Suitable surfacing of roads is needed for use during wet seasons. The design of roads should offset the limited ability of the soil to support a load. Roads are dusty when dry. Surface treatment may be desirable during periods of heavy use. Rock for construction of roads generally is not available in areas of this unit.

Plant competition is a concern affecting the production of timber. When openings are made in the canopy, invading brushy plants that are not controlled can delay the establishment of seedlings. The soil has a low capacity to hold nutrients and water. As a result, the establishment of seedlings may be difficult. Reforestation can be accomplished by planting redwood and Douglas-fir seedlings. Natural reforestation by redwood sprouts and Douglas-fir seed trees provides variable stocking results. Both overstocked and understocked areas are common.

Among the common forest understory plants are tanoak, brackenfern, bedstraw, salal, California huckleberry, and swordfern.

The main limitations affecting homesite development are low strength, the seasonally saturated soil conditions, and the restricted permeability in the subsoil. The design of buildings and roads should offset the limited ability of the soil to support a load. The seasonally saturated soil conditions and the restricted permeability increase the possibility of failure of septic tank absorption fields. Alternative systems may be needed, such as those in which leach lines are placed in a mound above the soil surface.

The capability classification is IIIe-2(4), nonirrigated.

142—Fishrock-Iversen complex, 2 to 15 percent slopes

This map unit is on ridgetops and the upper side slopes of coastal hills and mountains. The vegetation is mainly manzanita and bishop pine on the Fishrock soil and Douglas-fir and redwood on the Iversen soil. Elevation ranges from 600 to 1,300 feet. The average annual precipitation is 45 to 55 inches, the average annual air temperature is about 55 degrees F, and the average frost-free period is 250 to 320 days.

This unit is about 60 percent Fishrock loam and 20 percent Iversen loam. The Fishrock and Iversen soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Seaside soils, soils that are more than 40 inches deep to bedrock, and small areas that have slopes of 15 to 30 percent. Included areas make up about 20 percent of the total acreage of the unit. The percentage varies from one area to another.

The Fishrock soil is shallow to bedrock and is well drained. It formed in material derived from sandstone or mudstone. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is brown loam about 2 inches thick. The upper 5 inches of the subsoil is reddish yellow clay loam. The lower 5 inches is light yellowish brown clay. Hard, fractured sandstone is at a depth of about 12 inches.

Permeability is slow in the Fishrock soil. Available

water capacity is very low. The effective rooting depth is limited by bedrock at a depth of 10 to 20 inches. Surface runoff is slow or medium, and the hazard of water erosion is slight or moderate if the surface is left bare.

The Iversen soil is moderately deep to weathered bedrock and is well drained. It formed in material derived from sandstone and shale. Typically, the surface is covered with a mat of litter about 1 inch thick. The surface layer is yellowish brown and light brown loam about 7 inches thick. The upper 15 inches of the subsoil is reddish yellow clay. The lower 15 inches is strong brown gravelly clay. Soft, fractured, interlayered sandstone and shale are at a depth of about 37 inches.

Permeability is slow in the Iversen soil. Available water capacity is moderate. The effective rooting depth is limited by weathered bedrock at a depth of 20 to 40 inches. Surface runoff is slow or medium, and the hazard of water erosion is slight or moderate if the surface is left bare.

This unit is used for homesite development, as wildlife habitat or watershed, or for limited timber production.

The main limitations affecting homesite development are the slope, the slow permeability, and low strength. The shallow depth to bedrock of the Fishrock soil and the moderate depth to bedrock of the Iversen soil are also limitations. Excavations for roads and buildings increase the hazard of erosion. Revegetating disturbed areas around construction sites as soon as possible helps to control erosion. The design of access roads should control surface runoff and help to stabilize cut slopes. The design of buildings and roads should offset the limited ability of the soils to support a load. The restricted permeability and the limited depth to bedrock increase the possibility of failure of septic tank absorption fields. Alternative systems may be needed, such as those in which leach lines are placed in a mound above the soil surface.

Douglas-fir, redwood, and tanoak are the main tree species on the Iversen soil. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 87 on this soil, and that for redwood is 127. The potential annual production from a fully stocked stand of Douglas-fir is 185 board feet per acre on the Iversen soil. Areas of this unit that are subject to strong, persistent winds, which limit tree height, are less productive than other areas. Trees of limited extent include Pacific madrone, chinkapin, and bishop pine. Stands of conifers commonly are small and widely scattered.

The main limitation affecting the harvesting of timber is seasonal wetness. Using wheeled and tracked equipment when the soils are wet produces ruts, compacts the surface, and can damage the roots of trees. Disturbance of the protective layer of duff can be minimized by the careful use of wheeled and tracked equipment. Roads on this unit are dusty when dry. Surface treatment may be desirable during periods of heavy use. Unsurfaced roads and skid trails are slippery when wet. They may be impassable during rainy periods. Suitable surfacing of roads is needed for use during wet seasons. Rock for construction of roads generally is not available in areas of this unit.

Plant competition and seedling establishment are concerns affecting the production of timber. When openings are made in the canopy, invading brushy plants that are not controlled can prevent the establishment of seedlings. Reforestation can be accomplished by planting Douglas-fir and redwood seedlings. The droughtiness of the upper 24 inches reduces the seedling survival rate, especially on south- and southwest-facing slopes. If seed trees are present, natural reforestation of cutover areas by Douglas-fir occurs infrequently. Redwood can regenerate by sprouting after cutting. These sprouts seldom provide optimum stocking.

The capability classification is VIe(4), nonirrigated.

143—Fishrock-Iversen complex, 15 to 30 percent slopes

This map unit is on ridgetops and the upper side slopes of coastal hills and mountains. The vegetation is mainly manzanita and bishop pine on the Fishrock soil and Douglas-fir and redwood on the Iversen soil. Elevation ranges from 600 to 1,300 feet. The average annual precipitation is 45 to 55 inches, the average annual air temperature is about 55 degrees F, and the average frost-free period is 250 to 320 days.

This unit is about 60 percent Fishrock loam and 20 percent Iversen loam. The Fishrock and Iversen soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Seaside soils, soils that are more than 40 inches deep to bedrock, and small areas that have slopes of 9 to 15 percent or 30 to 50 percent. Included areas make up about 20 percent of the total acreage of the unit. The percentage varies from one area to another.

The Fishrock soil is shallow to bedrock and is well drained. It formed in material derived from sandstone

or mudstone. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is brown loam about 2 inches thick. The upper 5 inches of the subsoil is reddish yellow clay loam. The lower 5 inches is light yellowish brown clay. Hard, fractured sandstone is at a depth of about 12 inches. The depth to sandstone ranges from 10 to 20 inches.

Permeability is slow in the Fishrock soil. Available water capacity is very low. The effective rooting depth is limited by bedrock at a depth of 10 to 20 inches. Surface runoff is rapid, and the hazard of water erosion is moderate if the surface is left bare.

The Iversen soil is moderately deep to weathered bedrock and is well drained. It formed in material derived from sandstone and shale. Typically, the surface is covered with a mat of litter about 1 inch thick. The surface layer is yellowish brown and light brown loam about 7 inches thick. The upper 15 inches of the subsoil is reddish yellow clay. The lower 15 inches is strong brown gravelly clay. Soft, fractured, interlayered sandstone and shale are at a depth of about 37 inches.

Permeability is slow in the Iversen soil. Available water capacity is moderate. The effective rooting depth is limited by weathered bedrock at a depth of 20 to 40 inches. Surface runoff is rapid, and the hazard of water erosion is moderate if the surface is left bare.

This unit is used for homesite development, wildlife habitat, watershed, or limited timber production.

The main limitations affecting homesite development are the slope, the restricted permeability, and low strength. The shallow depth to bedrock of the Fishrock soil and the moderate depth to bedrock of the Iversen soil are also limitations. The most favorable building sites are in the less sloping areas of this unit. Excavations for roads and buildings increase the hazard of erosion. Revegetating disturbed areas around construction sites as soon as possible helps to control erosion. The design of access roads should control surface runoff and help to stabilize cut slopes. The design of buildings and roads should offset the limited ability of the soils to support a load. The restricted permeability and the limited depth to bedrock increase the possibility of failure of septic tank absorption fields. The slope is also a concern affecting the installation of septic tank absorption fields. Alternative systems may be needed, such as those in which leach lines are placed in a mound above the soil surface.

Douglas-fir, redwood, and tanoak are the main tree species on the Iversen soil. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 87 on this soil, and that for redwood is 127. The potential annual production from a fully stocked stand of Douglas-fir is 185 board feet per acre on the Iversen soil. Areas of this unit that are subject to strong persistent winds, which limit tree height, are less productive than other areas. Trees of limited extent include Pacific madrone, chinkapin, and bishop pine. Stands of conifers commonly are small and widely scattered.

The main limitation affecting the harvesting of timber is seasonal wetness. Using wheeled and tracked equipment when the soils are moist produces ruts, compacts the surface, and can damage the roots of trees. Disturbance of the protective layer of duff can be minimized by the careful use of wheeled and tracked equipment. Roads on this unit are dusty when dry. Surface treatment may be desirable during periods of heavy use. Unsurfaced roads and skid trails are slippery when wet. They may be impassable during rainy periods. Suitable surfacing of roads is needed for use during wet seasons. Rock for construction of roads generally is not available in areas of this unit.

Plant competition and seedling establishment are concerns affecting the production of timber. When openings are made in the canopy, invading brushy plants that are not controlled can prevent the establishment of seedlings. Reforestation can be accomplished by planting Douglas-fir and redwood seedlings. The droughtiness of the upper 24 inches reduces the seedling survival rate, especially on south- and southwest-facing slopes. If seed trees are present, natural reforestation of cutover areas of Douglas-fir occurs infrequently. Redwood can regenerate by sprouting after cutting. These sprouts seldom provide optimum stocking.

The capability classification is VIe(4), nonirrigated.

144—Flumeville clay loam, 0 to 5 percent slopes

This very deep, poorly drained soil is on marine terraces. It formed in alluvium derived from mixed rock sources. The vegetation is mainly perennial grasses and forbs. Elevation ranges from 10 to 1,200 feet. The average annual precipitation is 35 to 45 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 250 to 330 days.

Typically, the surface layer is dark gray clay loam about 11 inches thick. The upper 15 inches of the subsoil is grayish brown clay loam and clay that have reddish brown and strong brown mottles. The lower

36 inches is light gray and white clay that has strong brown mottles. In some areas the surface layer is loam.

Included with this soil in mapping are small areas of Windyhollow and Cabrillo soils and Tropaquepts. Also included are small areas that have slopes of 5 to 9 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is very slow in the Flumeville soil. Available water capacity is high. The effective rooting depth is limited by saturation for long periods following episodes of heavy rain from December through April. The saturated zone starts between the depths of 12 and 30 inches and extends to a depth of more than 60 inches. Surface runoff is very slow or slow, and the hazard of water erosion is slight if the surface is left bare.

This unit is used for livestock grazing, hay production, pasture, or wildlife habitat.

In areas used for livestock grazing, the characteristic plant community is mainly common velvetgrass, bentgrass, and California oatgrass.

The main limitations affecting range management are trafficability and the seasonally saturated soil conditions. The use of equipment is limited to dry periods. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock. If seeding is considered, species that are tolerant of the saturated soil conditions should be selected.

If this unit is used for hay production or pasture, the main limitations are the seasonally saturated soil conditions, the very slow permeability, and the clayey textures. The wetness limits the choice of plants and the period of cutting. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and minimize surface compaction. Because of the restricted permeability, applications of irrigation water should be regulated so that adequate infiltration is possible. The seasonally saturated soil conditions reduce the amount of irrigation water needed. Because of the clayey textures, grazing when the soil is wet causes compaction and poor tilth. Grazing should be deferred when the surface layer is saturated.

Windbreaks may be desirable on this unit to protect buildings, livestock, and fields from prevailing winds. The main limitation affecting the establishment of windbreaks is the seasonal wetness. Trees and shrubs that are tolerant of saturated soil conditions should be planted. Among the trees that are suitable for planting are eucalyptus and bishop pine.

The capability classification is IIIw-2(4), nonirrigated, and IIw-2(4), irrigated.

145—Flumeville clay loam, 5 to 15 percent slopes

This very deep, poorly drained soil is on marine terraces. It formed in alluvium derived from mixed rock sources. The vegetation is mainly perennial grasses and forbs. Elevation ranges from 100 to 1,200 feet. The average annual precipitation is 35 to 45 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 250 to 330 days.

Typically, the surface layer is dark gray clay loam about 11 inches thick. The upper 15 inches of the subsoil is grayish brown clay loam and clay that have reddish brown and strong brown mottles. The lower 36 inches is light gray and white clay that has strong brown mottles. In some areas the surface layer is loam.

Included with this soil in mapping are small areas of Windyhollow and Cabrillo soils and Tropaquepts. Also included are small areas that have slopes of 2 to 5 percent or 15 to 30 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is very slow in the Flumeville soil. Available water capacity is high. The soil is saturated with water for long periods following episodes of heavy rain from December through April. The saturated zone starts between the depths of 12 and 30 inches and extends to a depth of more than 60 inches. Surface runoff is medium, and the hazard of water erosion is moderate if the surface is left bare.

This unit is used for livestock grazing, hay, pasture, or wildlife habitat.

In areas used for livestock grazing, the characteristic plant community is mainly common velvetgrass, bentgrass, and California oatgrass.

The main limitations affecting range management are trafficability and the seasonally saturated soil conditions. The use of equipment is limited to dry periods. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock. If seeding is considered, species that are tolerant of saturated soil conditions should be selected.

If this unit is used for hay production or pasture, the main limitations are the hazard of erosion, the seasonally saturated soil conditions, the restricted permeability, and the clayey textures. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good

condition, minimize surface compaction, and help to control erosion. Seedbed preparation should be on the contour or across the slope where practical. Wetness limits the choice of plants and the period of cutting. Because of the restricted permeability, the regulation of irrigation water is needed to control runoff and erosion. The seasonally saturated soil conditions reduce the amount of irrigation water needed. Because of the clayey texture, grazing when the soil is wet causes compaction and poor tilth and increases the runoff rate. Grazing should be deferred when the surface layer is saturated.

Windbreaks may be desirable on this unit to protect buildings, livestock, and fields from prevailing winds. The main limitation affecting the establishment of windbreaks is the seasonal wetness. Trees and shrubs that are tolerant of saturated soil conditions should be planted. Among the trees that are suitable for planting are eucalyptus and bishop pine.

The capability classification is IIIw-2(4), irrigated and nonirrigated.

146—Garcia-Snook-Gube complex, 50 to 75 percent slopes

This map unit is on mountains, mainly on south-facing slopes. The vegetation is mainly brush on the Gube and Snook soils and hardwoods on the Garcia soil. Elevation ranges from 1,500 to 3,000 feet. The average annual precipitation is 50 to 70 inches, the average annual air temperature is about 55 degrees F, and the average frost-free period is 150 to 250 days.

This unit is about 35 percent Garcia loam, 30 percent Snook loam, and 20 percent Gube loam. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Woodin, Wohly, and Casabonne soils and areas of Rock outcrop. Also included are small areas that have slopes of 30 to 50 percent or 75 to 99 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

The Garcia soil is moderately deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is dark grayish brown loam about 11 inches thick. The upper 8 inches of the subsoil is yellowish brown loam. The lower 9 inches is very pale brown gravelly clay loam. Hard, fractured sandstone is at a depth of about 28 inches.

Permeability is moderate in the Garcia soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

The Snook soil is very shallow to bedrock and is somewhat excessively drained. It formed in material derived from sandstone or shale. Typically, the surface layer is pale brown loam about 6 inches thick over hard, fractured sandstone. In some areas the surface layer is gravelly loam.

Permeability is moderate in the Snook soil. Available water capacity is very low. The effective rooting depth is limited by bedrock at a depth of 4 to 10 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

The Gube soil is moderately deep to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about $^1/_2$ inch thick. The surface layer is very pale brown loam about 4 inches thick. The upper 12 inches of the subsoil is very pale brown clay loam. The lower 14 inches is yellow clay. Soft sandstone bedrock is at a depth of about 30 inches.

Permeability is slow in the Gube soil. Available water capacity is low. The effective rooting depth is limited by weathered bedrock at a depth of 20 to 40 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

This unit is used as watershed or wildlife habitat. The Garcia soil is also used for limited firewood and timber production.

The characteristic plant community in areas of the Gube and Snook soils is mainly chamise, manzanita, and ceanothus.

Tanoak and canyon live oak are the main tree species on the Garcia soil. Trees of limited extent include Douglas-fir and bigleaf maple. Estimates of site index and the potential annual production for Douglas-fir have not been made. Stands of conifers commonly are small and widely scattered; thus, they generally are not of commercial value.

The main limitations affecting the harvesting of trees are the slope and the low volume of commercial species. Roads may fail and landslides may occur following deep soil disturbance. Because of these limitations, harvesting of trees is generally not feasible on this unit.

Among the common forest understory plants are California hazel and tanoak.

The capability classification is VIIe(5), nonirrigated.

147—Gibney-Gibwell complex, 2 to 15 percent slopes

This map unit is on marine terraces. The vegetation is mainly bishop pine, huckleberry, and manzanita. Elevation ranges from 250 to 700 feet. The average annual precipitation is 40 to 65 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 270 to 330 days.

This unit is about 40 percent Gibney loam and 35 percent Gibwell loamy sand. The Gibney and Gibwell soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Shinglemill soils and Tropaquepts. These included soils make up about 25 percent of the total acreage of the unit. The percentage varies from one area to another.

The Gibney soil is very deep and is somewhat poorly drained. It formed in marine sediments. Typically, the surface is covered with a mat of litter about 3 inches thick. The surface layer is pale yellow loam about 9 inches thick. The upper 6 inches of the subsoil is brownish yellow sandy clay loam. The next layer is yellowish brown clay loam about 14 inches thick. Below this is about 11 inches of yellowish brown clay that has strong brown and red mottles. The next layer is about 15 inches of brownish yellow clay that has strong brown, red, and light gray mottles. The lower part of the subsoil to a depth of 63 inches or more is light gray sandy clay loam that has strong brown and red mottles.

Permeability is slow in the Gibney soil. Available water capacity is high. The effective rooting depth is limited by saturation for brief or long periods following episodes of heavy rain from December through April. The saturated zone starts between the depths of 30 and 48 inches and extends to a depth of more than 60 inches. Surface runoff is slow or medium, and the hazard of water erosion is slight or moderate if the surface is left bare.

The Gibwell soil is very deep and is well drained. It formed in eolian sands. Typically, the surface is covered with a mat of leaves and twigs about 2 inches thick. The surface layer is light gray loamy sand about 12 inches thick. The next layer is brownish yellow and light gray clay loam about 6 inches thick. The upper 8 inches of the subsoil is yellowish brown clay. The lower 16 inches is strong brown sandy clay loam. The substratum to a depth of 65 inches or more is pale yellow loamy sand.

Permeability is slow in the Gibwell soil. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Surface runoff is slow or medium, and the hazard of water erosion is slight or moderate if the surface is left bare.

This unit is used for homesite development, watershed, or wildlife habitat.

The main limitations affecting homesite development are the slow permeability, the slope, and the seasonally saturated soil conditions in the Gibney soil and the sloughing of cutbanks in areas of the Gibwell soil. Excavations for roads and buildings increase the hazard of erosion. Revegetating disturbed areas as soon as possible helps to control erosion. The design of access roads should control surface runoff and help to stabilize cut slopes. Surface drainage may be needed for roads and buildings. The seasonally saturated conditions and the restricted permeability increase the possibility of failure of septic tank absorption fields. Alternative systems may be needed, such as those in which leach lines are placed in a mound above the soil surface.

The capability classification is IVe-3(4), nonirrigated.

148—Gibwell loamy sand, 2 to 9 percent slopes

This very deep, well drained soil is on stabilized sand dunes on marine terraces. It formed in eolian sands. The vegetation is mainly bishop pine and manzanita. Elevation ranges from 250 to 550 feet. The average annual precipitation is 40 to 65 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 270 to 330 days.

Typically, the surface is covered with a mat of leaves and twigs about 2 inches thick. The surface layer is light gray loamy sand about 12 inches thick. The next layer is brownish yellow and light gray clay loam about 6 inches thick. The upper 8 inches of the subsoil is yellowish brown clay. The lower 16 inches is strong brown sandy clay loam. The substratum to a depth of 65 inches or more is pale yellow loamy sand.

Included with this soil in mapping are small areas of Gibney and Shinglemill soils and Tropaquepts. Also included are small areas that have slopes of 9 to 15 percent. Included areas make up about 25 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is slow in the Gibwell soil. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Surface runoff is slow or medium, and the hazard of water erosion is slight or moderate if the surface is left bare.

This unit is used for homesite development, watershed, or wildlife habitat.

The main limitations affecting homesite development are the slow permeability in the subsoil and the sloughing of cutbanks. The restricted permeability increases the possibility of failure of septic tank absorption fields. Enlarging the absorption field and using low-volume flush toilets may be necessary. The design of access roads should control surface runoff and help to stabilize cut slopes.

The capability classification is IVe-3(4), nonirrigated.

149—Gibwell loamy sand, 9 to 15 percent slopes

This very deep, well drained soil is on stabilized sand dunes on marine terraces. It formed in eolian sands. The vegetation is mainly bishop pine and manzanita. Elevation ranges from 270 to 550 feet. The average annual precipitation is 40 to 65 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 270 to 330 days.

Typically, the surface is covered with a mat of leaves and twigs about 2 inches thick. The surface layer is gray, light gray, and very pale brown loamy sand about 12 inches thick. The next layer is brownish yellow and light gray clay loam about 6 inches thick. The upper 8 inches of the subsoil is yellowish brown clay. The lower 16 inches is strong brown sandy clay loam. The substratum to a depth of 65 inches or more is pale yellow loamy sand.

Included with this soil in mapping are small areas of Gibney and Shinglemill soils and Tropaquepts. Also included are small areas that have slopes of 5 to 9 percent or 15 to 30 percent. Included areas make up about 25 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is slow in the Gibwell soil. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Surface runoff is medium, and the hazard of water erosion is moderate if the surface is left bare.

This unit is used for homesite development, watershed, or wildlife habitat.

The main limitations affecting homesite development are the slope, the slow permeability in the subsoil, and the sloughing of cutbanks. Excavations for roads and buildings increase the hazard of erosion. Revegetating disturbed areas around construction sites as soon as possible helps to control erosion. The design of access roads should control surface runoff and help to stabilize cut slopes. The restricted permeability increases the possibility of failure of septic tank absorption fields. Enlarging the absorption field and using low-volume flush toilets may be necessary.

The capability classification is IVe-3(4), nonirrigated.

150—Glenblair gravelly loam, 9 to 30 percent slopes

This well drained soil is deep or very deep to bedrock. It is on hills. It formed in material derived from metamorphosed basalt. The vegetation is mainly redwood and Douglas-fir. Elevation ranges from 100 to 800 feet. The average annual precipitation is 40 to 70 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 290 to 365 days.

Typically, the surface is covered with a mat of leaves and twigs about 2 inches thick. The surface layer is dark reddish gray gravelly loam about 10 inches thick. The upper 29 inches of the subsoil is dark reddish gray gravelly clay loam. The lower 23 inches is dark reddish gray very gravelly clay loam. Hard, fractured metamorphosed basalt is at a depth of about 62 inches. In some areas the surface layer is gravelly clay loam, loam, or clay loam.

Included with this soil in mapping are small areas of Irmulco and Tramway soils and small areas of soils that have been altered by skid trails, landings, and roads. Also included are small areas that have slopes of 30 to 50 percent. Included areas make up about 25 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is moderately slow in the Glenblair soil. Available water capacity is moderate. The effective rooting depth is limited by bedrock at a depth of 40 to 70 inches. Surface runoff is rapid, and the hazard of water erosion is moderate if the surface is left bare.

This unit is used for timber production, as a source of hard rock, or as watershed.

Redwood and Douglas-fir are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index is 152 for redwood and 158 for Douglas-fir. The potential annual production

from a fully stocked stand of redwood is 1,310 board feet per acre. Trees of limited extent include tanoak and grand fir.

The main limitation affecting the harvesting of timber is seasonal wetness. Using wheeled and tracked equipment when the soil is moist produces ruts, compacts the surface, and can damage the roots of trees. Roads on this unit are dusty when dry. Surface treatment may be desirable during periods of heavy use. Unsurfaced roads and skid trails are slippery when wet. They may be impassable during rainy periods. Suitable surfacing of roads is needed for use during wet seasons. Rock for construction of roads generally is available in areas of this unit.

Plant competition is a concern affecting the production of timber. When openings are made in the canopy, invading brushy plants that are not controlled can delay the establishment of seedlings. Reforestation can be accomplished by planting redwood and Douglas-fir seedlings. Natural reforestation by redwood sprouts and Douglas-fir seed trees provides variable stocking results. Both overstocked and understocked areas are common.

Among the common forest understory plants are tanoak, California huckleberry, oxalis, and swordfern.

The capability classification is IVe-1(4), nonirrigated.

151—Glenblair gravelly loam, 30 to 50 percent slopes

This well drained soil is deep or very deep to bedrock. It is on steep hills. It formed in material derived dominantly from metamorphosed basalt. The vegetation is mainly redwood and Douglas-fir. Elevation ranges from 100 to 800 feet. The average annual precipitation is 40 to 70 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 290 to 365 days.

Typically, the surface is covered with a mat of leaves and twigs about 2 inches thick. The surface layer is dark reddish gray gravelly loam about 10 inches thick. The upper 29 inches of the subsoil is dark reddish gray gravelly clay loam. The lower 23 inches is dark reddish gray very gravelly clay loam. Hard, fractured metamorphosed basalt is at a depth of about 62 inches. In some areas the surface layer is gravelly clay loam, loam, or clay loam.

Included with this soil in mapping are small areas of Irmulco and Tramway soils. Also included are small areas that have slopes of 15 to 30 percent or 50 to 75 percent. Included areas make up about 25 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is moderately slow in the Glenblair soil. Available water capacity is moderate. The effective rooting depth is limited by bedrock at a depth of 40 to 70 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

This unit is used for timber production, as a source of hard rock, or as watershed.

Redwood and Douglas-fir are the main tree species. On the basis of a 100-year site curve, the mean site index is 152 for redwood and 158 for Douglas-fir. The potential annual production from a fully stocked stand of redwood is 1,310 board feet per acre. Trees of limited extent include tanoak and grand fir.

The main limitations affecting the harvesting of timber are the slope, the hazard of erosion, and seasonal wetness. Wheeled and tracked equipment can be used in the more gently sloping areas, but cable yarding systems generally cause less disturbance of the soil in the steeper areas. Disturbance of the protective layer of duff can be minimized by the careful use of either wheeled and tracked equipment or cable yarding systems. Unless adequate plant cover or water bars are provided, steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying. Establishing plant cover on steep cut and fill slopes reduces the hazard of surface erosion. Using wheeled and tracked equipment when the soil is wet produces ruts, compacts the surface, and can damage the roots of trees. Roads on this unit are dusty when dry. Surface treatment may be desirable during periods of heavy use. Unsurfaced roads and skid trails are slippery when wet. They may be impassable during rainy periods. Suitable surfacing of roads is needed for use during wet seasons. Rock for construction of roads generally is available in areas of this unit.

Plant competition is a concern affecting the production of timber. When openings are made in the canopy, invading brushy plants that are not controlled can delay the establishment of seedlings. Reforestation can be accomplished by planting redwood and Douglas-fir seedlings. Natural reforestation by redwood sprouts and Douglas-fir seed trees provides variable stocking results. Both overstocked and understocked areas are common.

Among the common forest understory plants are tanoak, California huckleberry, oxalis, and swordfern.

The capability classification is VIe(4), nonirrigated.

152—Glenblair gravelly loam, 50 to 75 percent slopes

This well drained soil is deep or very deep to bedrock. It is on very steep hills. It formed in material derived dominantly from metamorphosed basalt. The vegetation is mainly redwood and Douglas-fir. Elevation ranges from 100 to 800 feet. The average annual precipitation is 40 to 70 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 290 to 365 days.

Typically, the surface is covered with a mat of leaves and twigs about 2 inches thick. The surface layer is dark reddish gray gravelly loam about 10 inches thick. The upper 29 inches of the subsoil is dark reddish gray gravelly clay loam. The lower 23 inches is dark reddish gray very gravelly clay loam. Hard, fractured metamorphosed basalt is at a depth of about 62 inches. In some areas the surface layer is gravelly clay loam, loam, or clay loam.

Included with this soil in mapping are small areas of Irmulco and Tramway soils and small areas of soils that have been altered by skid trails, landings, and roads. Also included are small areas that have slopes of 30 to 50 percent or 75 to 99 percent. Included areas make up about 25 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is moderately slow in the Glenblair soil. Available water capacity is moderate. The effective rooting depth is limited by bedrock at a depth of 40 to 70 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

This unit is used for timber production, as a source of hard rock, or as watershed.

Redwood and Douglas-fir are the main tree species on this soil. On the basis of a 100-year site curve, the mean site index is 152 for redwood and 158 for Douglas-fir. The potential annual production from a fully stocked stand of redwood is 1,310 board feet per acre. Trees of limited extent include tanoak and grand fir.

The main limitations affecting the harvesting of timber are the slope, the hazard of erosion, and seasonal wetness. When timber is harvested, the slope limits the use of wheeled and tracked equipment in skidding operations. Cable yarding systems generally cause less disturbance of the soil. Unless adequate plant cover or water bars are provided, steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying. Harvesting systems that lift logs entirely off the ground minimize the disturbance of the protective layer of duff. Establishing plant cover on steep cut and fill slopes reduces the hazard of surface erosion. Roads may fail and landslides may occur following deep soil disturbance in the steeper areas. Roads are dusty when dry. Surface treatment may be desirable during periods of heavy use. Unsurfaced roads and skid trails are slippery when wet. They may be impassable during rainy periods. Suitable surfacing of roads is needed for use during wet seasons. Rock for construction of roads generally is available in areas of this unit.

Plant competition is a concern affecting the production of timber. When openings are made in the canopy, invading brushy plants that are not controlled can delay the establishment of seedlings. Reforestation can be accomplished by planting redwood and Douglas-fir seedlings. Natural reforestation by redwood sprouts and Douglas-fir seed trees provides variable stocking results. Both overstocked and understocked areas are common.

Among the common forest understory plants are tanoak, California huckleberry, oxalis, and swordfern.

The capability classification is VIIe(4), nonirrigated.

153—Gschwend-Frenchman complex, 0 to 9 percent slopes

This map unit is on river terraces. The vegetation is mainly Douglas-fir, redwood, and tanoak. Elevation ranges from 250 to 1,600 feet. The average annual precipitation is 40 to 80 inches, the average annual air temperature is about 54 degrees F, and the average frost-free period is 220 to 320 days.

This unit is about 50 percent Gschwend loam and 30 percent Frenchman very gravelly sandy loam. The Gschwend and Frenchman soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of poorly drained soils. Also included, in the Leggett area, are soils that formed in alluvium. A chemical imbalance caused by a low calcium-to-magnesium ratio restricts the growth of conifers in these areas. Also included are small areas of Riverwash and areas that have slopes of 9 to 15 percent. Included areas make up about 20 percent of the total acreage of the unit. The percentage varies from one area to another.

The Gschwend soil is very deep and is well drained. It formed in alluvium derived from sandstone. Typically, the surface is covered with a mat of leaves

and twigs about 1 inch thick. The surface layer is dark grayish brown and dark brown loam about 12 inches thick. The subsoil is yellowish brown and light yellowish brown, stratified sandy loam and loam about 23 inches thick. The substratum to a depth of 61 inches or more is very pale brown extremely gravelly sandy loam. In some areas the surface layer is sandy loam, gravelly loam, or gravelly sandy loam.

Permeability is moderate in the Gschwend soil. Available water capacity also is moderate. The effective rooting depth is 60 inches or more. Surface runoff is slow or medium, and the hazard of water erosion is slight or moderate if the surface is left bare.

The Frenchman soil is very deep and is well drained. It formed in alluvium derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 2 inches thick. The surface layer is light yellowish brown very gravelly sandy loam about 10 inches thick. The subsoil is light yellowish brown very gravelly sandy loam about 20 inches thick. The substratum to a depth of 62 inches or more is yellowish brown and light yellowish brown, stratified extremely gravelly sand and extremely cobbly loamy sand. In some areas the surface layer is loam or gravelly loam.

Permeability is moderate in the Frenchman soil. Available water capacity is low. The effective rooting depth is 60 inches or more. Surface runoff is slow or medium, and the hazard of water erosion is slight or moderate if the surface is left bare.

This unit is used mainly for timber production or wildlife habitat. A few areas are used for recreation.

Douglas-fir, tanoak, and redwood are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 168 on the Gschwend soil and 154 on the Frenchman soil. On the basis of a 100-year site curve, the mean site index for redwood is 157 on the Gschwend soil and 135 on the Frenchman soil. The site index varies with the amount of coarse fragments in the soil. The potential annual production from a fully stocked stand of redwood is 1,390 board feet per acre on the Gschwend soil and 1,045 board feet per acre on the Frenchman soil. Trees of limited extent include Pacific madrone.

The main limitation affecting the harvesting of timber is seasonal wetness. Using wheeled and tracked equipment when the soil is moist produces ruts, compacts the surface, and can damage the roots of trees. Disturbance of the protective layer of duff can be minimized by the careful use of wheeled and tracked equipment. Roads on the Gschwend soil are dusty when dry. Surface treatment may be desirable during periods of heavy use. Unsurfaced roads and skid trails are slippery when wet. They may be impassable during rainy periods. Suitable surfacing of roads is needed for use during wet seasons. Rock for construction of roads generally is available in areas of this unit.

Plant competition is a concern affecting the production of timber. When openings are made in the canopy, invading brushy plants that are not controlled can prevent the establishment of seedlings. If seed trees are present, natural reforestation of cutover areas by Douglas-fir occurs infrequently. Redwood can regenerate by sprouting after cutting. These sprouts seldom provide optimum stocking. Reforestation can be accomplished by planting Douglas-fir or redwood seedlings.

Among the common forest understory plants are California huckleberry, tanoak, brackenfern, and swordfern.

The capability classification is IVs-0(4), nonirrigated.

154—Gube-Garcia-Snook complex, 30 to 50 percent slopes

This map unit is on mountains, mainly on south-facing slopes. The vegetation is mainly brush on the Gube and Snook soils and hardwoods on the Garcia soil. Elevation ranges from 1,500 to 3,000 feet. The average annual precipitation is 50 to 70 inches, the average annual air temperature is about 55 degrees F, and the average frost-free period is 150 to 250 days.

This unit is about 35 percent Gube loam, 30 percent Garcia loam, and 20 percent Snook loam. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Wohly, Casabonne, and Woodin soils and areas of Rock outcrop. Also included are small areas that have slopes of 15 to 30 percent or 50 to 75 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

The Gube soil is moderately deep to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1/2 inch thick. The surface layer is very pale brown loam about 4 inches thick. The upper 12 inches of the

subsoil is very pale brown clay loam. The lower 14 inches is yellow clay. Soft sandstone bedrock is at a depth of about 30 inches.

Permeability is slow in the Gube soil. Available water capacity is low. The effective rooting depth is limited by weathered bedrock at a depth of 20 to 40 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

The Garcia soil is moderately deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is dark grayish brown loam about 11 inches thick. The upper 8 inches of the subsoil is yellowish brown loam. The lower 9 inches is very pale brown gravelly clay loam. Hard, fractured sandstone is at a depth of about 28 inches.

Permeability is moderate in the Garcia soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

The Snook soil is very shallow to bedrock and is somewhat excessively drained. It formed in material derived from sandstone or shale. Typically, the surface layer is pale brown loam about 6 inches thick over hard, fractured sandstone. In some areas the surface layer is gravelly loam.

Permeability is moderate in the Snook soil. Available water capacity is very low. The effective rooting depth is limited by bedrock at a depth of 4 to 10 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

This unit is used as watershed or wildlife habitat. The Garcia soil is also used for limited firewood and timber production.

The characteristic plant community on the Gube and Snook soils is mainly chamise, manzanita, and ceanothus.

Tanoak and canyon live oak are the main tree species on the Garcia soil. Trees of limited extent include Douglas-fir and bigleaf maple. Estimates of site index and the potential annual production for Douglas-fir have not been made. Stands of conifers commonly are small and widely scattered; thus, they generally are not of commercial value.

The main limitations affecting the harvesting of trees are the slope, the hazard of erosion, and the low volume of commercial species. Because of these limitations, harvesting of trees is generally not feasible on this unit.

Among the common forest understory plants are California hazel and tanoak.

The capability classification is VIIe(5), nonirrigated.

155—Haploxeralfs-Argixerolls complex, 0 to 9 percent slopes

This map unit is on dissected river terraces. The vegetation is mainly scattered oaks, ponderosa pine, Douglas-fir, and manzanita. Cleared areas support annual and perennial grasses and forbs. Elevation ranges from 1,600 to 2,200 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is about 55 degrees F, and the average frost-free period is 150 to 250 days.

This unit is about 40 percent Haploxeralfs and 30 percent Argixerolls. The Haploxeralfs and Argixerolls occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Feliz soils and areas of the wet Haploxeralfs. Also included are small areas that have slopes of 9 to 15 percent. Included areas make up about 30 percent of the total acreage of the unit. The percentage varies from one area to another.

Haploxeralfs are very deep and are well drained. They formed in alluvium from mixed rock sources. A representative profile has a surface layer of light yellowish brown loam about 20 inches thick. The upper part of the subsoil is light yellowish brown clay loam about 30 inches thick. The lower part to a depth of 62 inches or more is very pale brown sandy clay loam. In some areas the surface layer is gravelly loam or sandy loam.

Permeability ranges from moderately rapid to moderately slow in the Haploxeralfs. Available water capacity is high. The effective rooting depth is 60 inches or more. Surface runoff is slow or medium, and the hazard of water erosion is slight or moderate if the surface is left bare.

Argixerolls are very deep and are well drained. They formed in alluvium derived from mixed rock sources. A representative profile is covered with a mat of litter about 1 inch thick. The surface layer is brown loam about 10 inches thick. The upper 6 inches of the subsoil is yellowish brown loam. The lower 46 inches is light yellowish brown clay loam. In some areas the surface layer is gravelly loam.

Permeability ranges from moderately rapid to moderately slow in the Argixerolls. Available water capacity is high. The effective rooting depth is more than 60 inches. Surface runoff is slow or medium,

and the hazard of water erosion is slight or moderate if the surface is left bare.

Cleared areas of this unit are used for homesite development, limited timber production, firewood, or livestock grazing.

Ponderosa pine, Douglas-fir, and California black oak are the main tree species on this unit. On the basis of a 100-year site curve, the site index for ponderosa pine ranges from 101 to 134 on the Haploxeralfs and from 98 to 133 on the Argixerolls. On the basis of a 100-year site curve, the site index for Douglas-fir ranges from 85 to 141 on the Haploxeralfs and from 97 to 131 on the Argixerolls. Site index varies with the amount of coarse fragments in the soils.

The main limitation affecting the harvesting of timber and firewood is seasonal wetness. Using wheeled and tracked equipment when the soils are wet produces ruts, compacts the surface, and can damage the roots of trees. Disturbance of the protective layer of duff can be minimized by the careful use of either wheeled or tracked equipment. Roads on this unit are dusty when dry. Surface treatment may be desirable during periods of heavy use. Unsurfaced roads and skid trails are soft when wet, and they may be impassable during rainy periods. Suitable surfacing of roads is needed for use during wet seasons. Rock for construction of roads is not readily available in areas of this unit.

Seedling establishment and plant competition are concerns affecting the production of timber. The soil temperature and low content of soil moisture during the growing season cause a high mortality rate of Douglas-fir seedlings, especially on south- and southwest-facing slopes. Carefully managing reforestation helps to control competition from undesirable plants and provides partial shade for seedlings. Reforestation can be accomplished by planting ponderosa pine or Douglas-fir seedlings. If seed trees are present, natural reforestation of cutover areas by ponderosa pine frequently occurs. Natural Douglas-fir seedlings typically do not survive. When openings are made in the canopy, invading brushy plants that are not controlled can prevent the establishment of seedlings.

Among the common forest understory plants are manzanita, red fescue, poison oak, and bedstraw.

The production of vegetation suitable for livestock grazing is limited by the tendency of these soils to produce woody species. In areas that support oaks and brush, forage production can be increased by harvesting trees and controlling brush. Maintaining vegetation in drainageways and leaving 8 to 10 scattered trees per acre help to control erosion, enhance the habitat for wildlife, and serve esthetic purposes. This unit responds well to fertilization, range seeding, and proper grazing use. The main limitation affecting seeding is the abundance of woody species. Among the common understory plants are purple needlegrass, soft chess, and filaree.

The main limitation affecting homesite development is the restricted permeability in some areas. The restricted permeability increases the possibility of failure of septic tank absorption fields. Alternative systems may be needed. Enlarging the absorption fields can help to overcome the restricted permeability.

The capability classification is IIe-1(14), nonirrigated.

156—Haploxeralfs, wet-Argixerolls complex, 0 to 5 percent slopes

This map unit is on dissected river terraces. The vegetation is mainly annual and perennial grasses and forbs and scattered oaks, manzanita, and ponderosa pine. Elevation ranges from 1,600 to 1,800 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is about 55 degrees F, and the average frost-free period is 150 to 250 days.

This unit is about 40 percent Haploxeralfs and 30 percent Argixerolls. The Haploxeralfs and Argixerolls occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of sandy soils. These included soils make up about 30 percent of the total acreage of the unit. The percentage varies from one area to another.

The wet Haploxeralfs are very deep and are poorly drained or somewhat poorly drained. They formed in alluvium derived from mixed rock sources. A representative profile has a surface layer of light yellowish brown loam about 20 inches thick. The upper 30 inches of the subsoil is light yellowish brown clay loam that has white mottles. The lower part of the subsoil to a depth of 62 inches or more is very pale brown sandy clay loam that has white mottles. In some areas the surface layer is sandy loam or gravelly loam.

Permeability ranges from moderately rapid to moderately slow in the Haploxeralfs. Available water capacity is very high. The effective rooting depth is limited by saturation for brief or long periods following episodes of heavy rain from December through April.

The saturated zone starts between the depths of 10 and 50 inches and extends to a depth of more than 60 inches. Runoff is ponded or slow, and the hazard of water erosion is slight if the surface is left bare.

Argixerolls are very deep and are well drained. They formed in alluvium derived from mixed rock sources. A representative profile is covered with a mat of litter about 1 inch thick. The surface layer is brown loam about 10 inches thick. The upper 6 inches of the subsoil is yellowish brown loam. The lower 46 inches is light yellowish brown clay loam. In some areas the surface layer is gravelly loam.

Permeability ranges from moderately rapid to moderately slow in the Argixerolls. Available water capacity is high. The effective rooting depth is more than 60 inches. Surface runoff is ponded or slow, and the hazard of water erosion is slight if the surface is left bare.

This unit is used for firewood, limited timber production, hay production, pasture, or homesite development.

Ponderosa pine, Douglas-fir, and California black oak are the main tree species on this unit. On the basis of a 100-year site curve, the site index for ponderosa pine ranges from 101 to 134 on the Haploxeralfs and from 98 to 133 on the Argixerolls. On the basis of a 100-year site curve, the site index for Douglas-fir ranges from 85 to 141 on the Haploxeralfs and from 97 to 131 on the Argixerolls. Site index varies with the amount of coarse fragments and the depth to seasonally saturated soil conditions.

The main limitation affecting the harvesting of timber and firewood is the seasonal wetness. Using wheeled and tracked equipment when the soils are wet produces ruts, compacts the surface, and can damage the roots of trees. Disturbance of the protective layer of duff can be minimized by careful use of either wheeled or tracked equipment. Roads on this unit are dusty when dry. Surface treatment may be desirable during periods of heavy use. Unsurfaced roads and skid trails are soft when wet, and they may be impassable during rainy periods. Suitable surfacing of roads is needed for use during wet seasons. Rock for construction of roads is not generally available in areas of this unit.

Seedling establishment and plant competition are concerns affecting the production of timber. Carefully managing reforestation helps to control competition from undesirable plants and provides partial shade for seedlings. Reforestation can be accomplished by planting ponderosa pine or Douglas-fir seedlings. If seed trees are present, natural reforestation of cutover areas by ponderosa pine frequently occurs. Natural Douglas-fir seedlings typically do not survive. Ponded water during the rainy season hinders root respiration, which results in a low seedling survival rate in the wet areas. Because the rooting depth is restricted by saturated soil conditions, trees may be subject to windthrow.

Among the common forest understory plants are red fescue, poison oak, bedstraw, and rushes.

The main limitations affecting the use of these soils as pasture are the saturated soil conditions and standing water in drainageways during the wet season. Plants that tolerate wetness should be seeded. Allowing grazing or using heavy equipment when the soils are wet results in compaction of the surface layer, which reduces productivity.

The main limitations affecting homesite development are ponding and the saturated soil conditions on the Haploxeralfs and ponding on the Argixerolls. These limitations increase the possibility of failure of septic tank absorption fields. Alternative systems may be needed, such as those in which leach lines are placed in a mound above the soil surface.

The capability classification of the Haploxeralfs is IIIw-2(14), nonirrigated. The capability classification of the Argixerolls is IIe-2(14), nonirrigated.

157—Harecreek sandy loam, 2 to 9 percent slopes

This very deep, well drained soil is on marine terraces. It formed in eolian sand. The vegetation is mainly bishop pine and redwood. Elevation ranges from 150 to 450 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 290 to 365 days.

Typically, the surface is covered with a mat of litter about 2 inches thick. The surface layer is gray and light brownish gray sandy loam about 8 inches thick. The upper 8 inches of the subsoil is light brownish gray and pale brown sandy loam. The lower 27 inches is light yellowish brown and strong brown sandy clay loam and sandy loam. The substratum to a depth of 63 inches or more is brownish yellow sand.

Included with this soil in mapping are small areas of Caspar, Cleone, and Tregoning soils and Tropaquepts. Also included are small areas that have slopes of 9 to 15 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is moderately rapid in the Harecreek soil. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Surface runoff is slow or medium, and the hazard of water erosion is slight or moderate if the surface is left bare.

This unit is used mainly for homesite development, watershed, or wildlife habitat. A few areas are used for timber production.

The main limitation affecting homesite development is the sloughing of cutbanks. The design of access roads should control surface runoff and help to stabilize cut slopes. If the density of housing is moderate or high, community sewage systems are needed to prevent the contamination of water supplies caused by seepage.

Redwood, Douglas-fir, and bishop pine are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index for redwood is 108 and that for Douglas-fir is 121. The potential annual production from a fully stocked stand of redwood is 430 board feet per acre. Areas that are subject to strong, persistent winds, which limit tree height, are less productive than other areas of this unit. Trees of limited extent include tanoak and grand fir.

The main limitation affecting the harvesting of timber is seasonal wetness. Using wheeled and tracked equipment when the soil is wet produces ruts, compacts the surface, and can damage the roots of trees. Disturbance of the protective layer of duff can be minimized by the careful use of either wheeled and tracked equipment or cable yarding systems. Establishing plant cover on steep cut and fill slopes reduces the hazard of erosion. Rock for construction of roads is generally not available in areas of this unit.

Plant competition is a concern affecting the production of timber. When openings are made in the canopy, invading brushy plants that are not controlled can delay the establishment of seedlings. Reforestation can be accomplished by planting redwood or Douglas-fir seedlings. Natural reforestation by Douglas-fir seed trees and redwood sprouts provides variable stocking results. Both overstocked and understocked areas are common.

Among the common forest understory plants are salal, California huckleberry, whipplea, tanoak, and Oregongrape.

The capability classification is IIIe-1(4), nonirrigated.

158—Havensneck sandy loam, 2 to 15 percent slopes

This well drained soil is moderately deep to weathered bedrock. It is on ridgetops and the upper side slopes of coastal hills and mountains. It formed in material derived from interlayered sandstone and shale. The vegetation is mainly bishop pine and manzanita. Elevation ranges from 400 to 1,110 feet. The average annual precipitation is 45 to 55 inches, the average annual air temperature is about 54 degrees F, and the average frost-free period is 250 to 330 days.

Typically, the surface is covered with a mat of bishop pine and manzanita litter about 2 inches thick. The surface layer is yellowish brown and pale brown sandy loam about 7 inches thick. The upper 14 inches of the subsoil is pink sandy loam. The lower 11 inches is reddish yellow sandy clay loam. Soft sandstone and shale bedrock is at a depth of about 32 inches.

Included with this soil in mapping are small areas of Fishrock, Gibney, Iversen, Shinglemill, and Tramway soils. Also included are small areas that have slopes of 15 to 30 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is moderate in the Havensneck soil. Available water capacity is low. The effective rooting depth is limited by weathered bedrock at a depth of 20 to 40 inches. Surface runoff is slow or medium, and the hazard of water erosion is slight or moderate if the surface is left bare.

This unit is used for homesite development, limited timber production, wildlife habitat, or watershed.

The main limitations affecting homesite development are the slope and the moderate depth to bedrock. Excavation for roads and buildings increases the hazard of erosion. Revegetating disturbed areas around construction sites as soon as possible helps to control erosion. The design of access roads should control surface runoff and help to stabilize cut slopes. The moderate depth to bedrock increases the possibility of failure of septic tank absorption fields. Alternative systems may be needed, such as those in which leach lines are placed in a mound above the soil surface.

Bishop pine, Douglas-fir, and redwood are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 102 and that for redwood is 101. The potential annual production from a fully stocked stand of Douglas-fir

is 185 board feet per acre. Areas that are subject to strong, persistent winds, which limit tree height, are less productive than other areas of this unit. Trees of limited extent include Pacific madrone and tanoak. Stands of conifers commonly are small and widely scattered.

The main limitation affecting the harvesting of timber is seasonal wetness. Using wheeled and tracked equipment when the soil is wet produces ruts, compacts the surface, and can damage the roots of trees. Disturbance of the protective layer of duff can be minimized by the careful use of either wheeled and tracked equipment or cable yarding systems. Establishing plant cover on steep cut and fill slopes reduces the hazard of erosion. Rock for construction of roads is generally not available in areas of this unit.

Plant competition is a concern affecting the production of timber. When openings are made in the canopy, invading brushy plants that are not controlled can prevent the establishment of seedlings. Reforestation can be accomplished by planting Douglas-fir seedlings. Redwood can regenerate by sprouting after cutting. These sprouts seldom provide optimum stocking.

Among the common forest understory plants are bishop pine, tanoak, California huckleberry, salal, and manzanita.

The capability classification is IIIe-8(4), nonirrigated.

159—Havensneck sandy loam, 15 to 30 percent slopes

This well drained soil is moderately deep to weathered bedrock. It is on ridgetops and the upper side slopes of coastal hills and mountains. It formed in material derived from interlayered sandstone and shale. The vegetation is mainly bishop pine and manzanita. Elevation ranges from 400 to 1,100 feet. The average annual precipitation is 45 to 55 inches, the average annual air temperature is about 54 degrees F, and the average frost-free period is 250 to 330 days.

Typically, the surface is covered with a mat of litter about 2 inches thick. The surface layer is yellowish brown and pale brown sandy loam about 7 inches thick. The upper 14 inches of the subsoil is pink sandy loam. The lower 11 inches is reddish yellow sandy clay loam. Soft sandstone and shale bedrock is at a depth of about 32 inches.

Included with this soil in mapping are small areas of Fishrock, Iversen, and Tramway soils. Also included are small areas that have slopes of 9 to 15 percent or 30 to 50 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is moderate in the Havensneck soil. Available water capacity is low. The effective rooting depth is limited by weathered bedrock at a depth of 20 to 40 inches. Surface runoff is rapid, and the hazard of water erosion is moderate if the surface is left bare.

This unit is used for homesite development, limited timber production, wildlife habitat, or watershed.

The main limitations affecting homesite development are the slope and the moderate depth to bedrock. The most favorable building sites are in the less sloping areas of this unit. Excavations for roads and buildings increase the hazard of erosion. Revegetating disturbed areas around construction sites as soon as possible helps to control erosion. The design of access roads should control surface runoff and help to stabilize cut slopes. The moderate depth to bedrock increases the possibility of failure of septic tank absorption fields. The slope is also a concern affecting the installation of septic tank absorption fields. Alternative systems may be needed.

Bishop pine, Douglas-fir, and redwood are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 102 and that for redwood is 101. The potential annual production from a fully stocked stand of Douglas-fir is 185 board feet per acre. Areas that are subject to strong, persistent winds, which limit tree height, are less productive than other areas of this unit. Trees of limited extent include Pacific madrone and tanoak. Stands of conifers commonly are small and widely scattered.

The main limitation affecting the harvesting of timber is the hazard of erosion in the steeper areas and seasonal wetness. Disturbance of the protective layer of duff can be minimized by the careful use of either wheeled and tracked equipment or cable yarding systems. Establishing plant cover on steep cut and fill slopes reduces the hazard of erosion. Using wheeled and tracked equipment when the soil is wet produces ruts, compacts the surface, and can damage the roots of trees. Rock for construction of roads is generally not available in areas of this unit.

Plant competition is a concern affecting the production of timber. When openings are made in the canopy, invading brushy plants that are not controlled can prevent the establishment of seedlings. Reforestation can be accomplished by planting Douglas-fir or redwood seedlings. If seed trees are

present, natural reforestation of cutover areas by Douglas-fir occurs infrequently. Redwood can regenerate by sprouting after cutting. These sprouts seldom provide optimum stocking.

Among the common forest understory plants are bishop pine, tanoak, California huckleberry, salal, and manzanita.

The capability classification is IVe-1(4), nonirrigated.

160—Havensneck-Seaside complex, 5 to 30 percent slopes

This map unit is on ridgetops and the upper side slopes of coastal hills and mountains. The vegetation is mainly bishop pine and manzanita. Elevation ranges from 400 to 1,100 feet. The average annual precipitation is 45 to 55 inches, the average annual air temperature is about 54 degrees F, and the average frost-free period is 250 to 330 days.

This unit is about 50 percent Havensneck sandy loam and 20 percent Seaside loamy sand. The Havensneck and Seaside soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Fishrock and Iversen soils and areas of Rock outcrop. Also included are small areas that have slopes of 30 to 50 percent. Included areas make up about 30 percent of the total acreage of the unit. The percentage varies from one area to another.

The Havensneck soil is moderately deep to weathered bedrock and is well drained. It formed in material derived from interlayered sandstone and shale. Typically, the surface is covered with a mat of litter about 2 inches thick. The surface layer is yellowish brown and pale brown sandy loam about 7 inches thick. The upper 14 inches of the subsoil is pink sandy loam. The lower 11 inches is reddish yellow sandy clay loam. Soft sandstone and shale bedrock is at a depth of about 32 inches.

Permeability is moderate in the Havensneck soil. Available water capacity is low. The effective rooting depth is limited by weathered bedrock at a depth of 20 to 40 inches. Surface runoff is medium or rapid, and the hazard of water erosion is moderate if the surface is left bare.

The Seaside soil is very shallow to bedrock and is somewhat excessively drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about $^{1}/_{2}$ inch thick. The surface layer is very pale brown loamy sand about 1 inch thick. The subsoil is pale brown sandy loam about 6 inches thick. Hard, fractured sandstone is at a depth of about 7 inches. In some areas the surface layer is bouldery sandy loam.

Permeability is rapid in the Seaside soil. Available water capacity is very low. The effective rooting depth is limited by bedrock at a depth of 5 to 10 inches. Surface runoff is medium or rapid, and the hazard of erosion is moderate if the surface is left bare.

This unit is used for homesite development, wildlife habitat, or watershed.

The main limitations affecting homesite development are the slope, the very shallow depth to bedrock of the Seaside soil, and the moderate depth to bedrock of the Havensneck soil. The most favorable building sites are in the less sloping areas of this unit. Excavations for roads and buildings increase the hazard of erosion. Revegetating disturbed areas around construction sites as soon as possible helps to control erosion. The design of access roads should control surface runoff and help to stabilize cut slopes. The limited depth to bedrock increases the possibility of failure of septic tank absorption fields. The slope is also a concern affecting the installation of septic tank absorption fields. Alternative systems may be needed.

The capability classification is VIIs(4), nonirrigated.

161—Heeser sandy loam, 2 to 15 percent slopes

This very deep, somewhat excessively drained soil is on marine terraces. It formed in eolian sands. The vegetation is mainly perennial grasses and forbs. Elevation ranges from 20 to 240 feet. The average annual precipitation is 35 to 45 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 250 to 330 days.

Typically, the surface layer is very dark grayish brown and dark brown sandy loam about 34 inches thick. The next layer is brown sandy loam about 12 inches thick. The underlying material to a depth of 65 inches or more is dark yellowish brown sandy loam. In some areas the surface layer is very gravelly sandy loam.

Included with this soil in mapping are small areas of Biaggi, Cabrillo, Crispin, and Sirdrak soils. Also included are small areas that have slopes of 15 to 30 percent. Included areas make up about 20 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is moderately rapid in the Heeser soil. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Surface runoff is

slow or medium, and the hazard of water erosion is slight or moderate if the surface is left bare.

This unit is used mainly for recreation, homesite development, livestock grazing, hay production, or pasture. A few areas are used for production of bulbs and vegetables.

The main limitations affecting recreational development are the hazards of soil blowing and landsliding at the ocean bluffs. Areas used for recreation can be protected from soil blowing by maintaining a plant cover. The risk of damage from landslides can be minimized by establishing trails, roads, and structures away from the ocean bluffs.

The main limitations affecting homesite development are the slope, the poor filtering capacity of the substratum, and the sloughing of cutbanks. Excavations for roads and buildings increase the hazard of erosion. Revegetating disturbed areas around construction sites as soon as possible helps to control erosion. The design of access roads should control surface runoff and help to stabilize cut slopes. The poor filtering capacity of the substratum increases the possibility of failure of septic tank absorption fields. Alternative systems may be needed, such as systems that increase separation distances from ground water. If the density of housing is moderate or high, community sewage systems are needed to prevent contamination.

In areas used for livestock grazing, the potential plant community is mainly bentgrass, common velvetgrass, and sweet vernalgrass. Soil properties generally do not limit range management.

If this unit is used for hay production or pasture, the main limitation is the moderately rapid permeability. Irrigation water should be applied to this soil in amounts that are sufficient to wet the root zone but are small enough to minimize the leaching of plant nutrients.

Windbreaks may be desirable on this unit to protect buildings, livestock, and fields from prevailing winds. The main limitation affecting the establishment of windbreaks is droughtiness. Supplemental irrigation is needed when windbreaks are established and during dry periods. Among the trees that are suitable for planting are eucalyptus, Monterey cypress, Monterey pine, and bishop pine.

The capability classification is IIIe-1(4), nonirrigated.

162—Hiltabidel-Dann complex, 5 to 75 percent slopes

This map unit is on mountains. The vegetation is mainly conifers and brush. Elevation ranges from 2,500 to 4,100 feet. The average annual precipitation is 60 to 70 inches, the average annual air temperature is about 55 degrees F, and the average frost-free period is 150 to 250 days.

This unit is about 75 percent Hiltabidel very stony clay loam and 15 percent Dann very cobbly clay loam. The Hiltabidel and Dann soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Littlered soils and areas of Rock outcrop. Included areas make up about 10 percent of the total acreage of the unit. The percentage varies from one area to another.

The Hiltabidel soil is very shallow or shallow to bedrock and is well drained. It formed in material derived dominantly from ultrabasic intrusive rocks. Typically, the surface is covered with a mat of leaves and twigs about 1/2 inch thick. The surface layer is reddish brown very stony clay loam about 13 inches thick. The next layer is reddish brown extremely stony clay loam about 4 inches thick. Hard, fractured peridotite is at a depth of about 17 inches. In some areas the surface layer is extremely stony clay loam.

Permeability is moderate in the Hiltabidel soil. Available water capacity is very low. The effective rooting depth is limited by bedrock at a depth of 6 to 20 inches. Surface runoff is medium to very rapid, and the hazard of water erosion is moderate to very severe if the surface is left bare.

The Dann soil is moderately deep to bedrock and is well drained. It formed in material derived from ultramafic intrusive rocks. The surface layer is reddish brown very cobbly clay loam about 5 inches thick. The subsoil is strong brown extremely stony clay loam about 26 inches thick. Hard, fractured peridotite is at a depth of about 31 inches. In some areas the surface layer is cobbly loam or cobbly clay loam.

Permeability is moderately slow in the Dann soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is medium to very rapid, and the hazard of water erosion is moderate to very severe if the surface is left bare.

This unit is used as wildlife habitat or as watershed. These soils have a chemical imbalance because of a low calcium-to-magnesium ratio. This imbalance restricts the growth of conifers.

The capability classification is VIIs(5), nonirrigated.

163—Holohan-Hollowtree complex, 50 to 75 percent slopes

This map unit is on hills and mountains. The vegetation is mainly tanoak and Douglas-fir. Elevation ranges from 500 to 4,000 feet. The average annual precipitation is 60 to 80 inches, the average annual air temperature is about 55 degrees F, and the average frost-free period is 150 to 250 days.

This unit is about 50 percent Holohan extremely gravelly sandy loam and 25 percent Hollowtree gravelly sandy loam. The Holohan and Hollowtree soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Casabonne and Wohly soils and areas of soils that have been altered by skid trails, landings, and roads. Also included are small areas that have slopes of 30 to 50 percent or 75 to 99 percent. Included areas make up about 25 percent of the total acreage of the unit. The percentage varies from one area to another.

The Holohan soil is very deep and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of litter about 4 inches thick. The surface layer is light gray extremely gravelly sandy loam about 4 inches thick. The upper 8 inches of the subsoil is very pale brown very gravelly loam. The next 5 inches is very pale brown extremely gravelly loam. The lower part of the subsoil to a depth of 74 inches or more is very pale brown extremely gravelly loamy sand. In some areas the surface layer is very gravelly loam.

Permeability is moderate in the Holohan soil. Available water capacity is low. The effective rooting depth is 60 inches or more. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

The Hollowtree soil is moderately deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of litter in a gravel mulch about 2 inches thick. The surface layer is light yellowish brown gravelly sandy loam about 6 inches thick. The upper 11 inches of the subsoil is very pale brown very gravelly loam. The lower 21 inches is yellow very gravelly sandy clay loam. Hard, fractured sandstone is at a depth of about 38 inches. In some areas the surface layer is very gravelly sandy loam or extremely gravelly sandy loam.

Permeability is moderate in the Hollowtree soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

This unit is used mainly for timber and firewood production. It is also used as watershed.

Tanoak, interior live oak, Douglas-fir, and Pacific madrone are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 132 on the Holohan soil and 106 on the Hollowtree soil. The potential annual production from a fully stocked stand of Douglas-fir is 550 board feet per acre on the Holohan soil and 310 board feet per acre on the Hollowtree soil.

The main limitations affecting the harvesting of timber and firewood are the slope and the hazard of erosion. When timber is harvested, the slope limits the use of wheeled and tracked equipment in skidding operations. Cable yarding systems generally cause less disturbance of the soil. Revegetation of exposed subsoil is difficult on this unit; however, it generally is not needed for control of surface erosion because of the large amount of coarse fragments. Roads may fail and landslides may occur following deep soil disturbance in the steeper areas. Rock for construction of roads generally is available in areas of this unit. Rocks and loose soil material may slide onto roads. This hazard increases the need for road maintenance.

Seedling establishment is a concern affecting the production of timber. Reforestation can be accomplished by planting Douglas-fir or ponderosa pine seedlings on this unit. The droughtiness of the upper 24 inches reduces the seedling survival rate, especially on south- and southwest-facing slopes. Movement of loose surface material can reduce the seedling survival rate in the steeper areas.

Among the common forest understory plants are tanoak, poison oak, and California huckleberry.

The capability classification is VIIs(5), nonirrigated.

164—Holohan-Hollowtree-Casabonne complex, 9 to 30 percent slopes

This map unit is on hills and mountains. The vegetation is mainly tanoak and Douglas-fir. Elevation ranges from 500 to 4,000 feet. The average annual precipitation is 60 to 80 inches, the average annual air temperature is about 55 degrees F, and the average frost-free period is 150 to 250 days.

This unit is about 60 percent Holohan extremely gravelly sandy loam, 15 percent Hollowtree gravelly sandy loam, and 15 percent Casabonne gravelly

loam. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Wohly soils and small areas of soils that have been altered by skid trails, landings, and roads. Also included are small areas that have slopes of 30 to 50 percent. Included areas make up about 10 percent of the total acreage of the unit. The percentage varies from one area to another.

The Holohan soil is very deep and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of litter about 4 inches thick. The surface layer is light gray extremely gravelly sandy loam about 4 inches thick. The upper 8 inches of the subsoil is very pale brown very gravelly loam. The next 5 inches is very pale brown extremely gravelly loam. The lower part of the subsoil to a depth of 74 inches or more is very pale brown extremely gravelly loamy sand. In some areas the surface layer is very gravelly loam.

Permeability is moderate in the Holohan soil. Available water capacity is low. The effective rooting depth is 60 inches or more. Surface runoff is medium or rapid, and the hazard of water erosion is moderate if the surface is left bare.

The Hollowtree soil is moderately deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of litter in a gravel mulch about 2 inches thick. The surface layer is light yellowish brown gravelly sandy loam about 6 inches thick. The upper 11 inches of the subsoil is very pale brown very gravelly loam. The lower 21 inches is yellow very gravelly sandy clay loam. Hard, fractured sandstone is at a depth of about 38 inches. In some areas the surface layer is very gravelly sandy loam or extremely gravelly sandy loam.

Permeability is moderate in the Hollowtree soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is medium or rapid, and the hazard of water erosion is moderate if the surface is left bare.

The Casabonne soil is deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of litter about $^{1}/_{2}$ inch thick. The surface layer is brown gravelly loam about 11 inches thick. The upper 25 inches of the subsoil is brown clay loam. The lower 13 inches is reddish yellow gravelly clay loam. Hard, fractured sandstone is at a depth of about 49 inches.

Permeability is moderate in the Casabonne soil. Available water capacity is moderate or high. The effective rooting depth is limited by bedrock at a depth of 40 to 60 inches. Surface runoff is medium or rapid, and the hazard of water erosion is moderate if the surface is left bare.

This unit is used mainly for timber and firewood production. It is also used as watershed.

Tanoak, interior live oak, Douglas-fir, and Pacific madrone are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 132 on the Holohan soil, 106 on the Hollowtree soil, and 144 on the Casabonne soil. The potential annual production from a fully stocked stand of Douglas-fir is 550 board feet per acre on the Holohan soil, 310 board feet per acre on the Hollowtree soil, and 665 board feet per acre on the Casabonne soil.

There are no major limitations affecting the harvesting of timber. Revegetation of exposed subsoil is difficult on the Holohan and Hollowtree soils; however, it generally is not needed for control of surface erosion because of the large amount of coarse fragments. Establishing plant cover on steep cut and fill slopes reduces the hazard of erosion on the Casabonne soil. Rock for construction of roads generally is available in areas of this unit.

Seedling establishment is a concern affecting the production of timber on the Holohan and Hollowtree soils. Reforestation can be accomplished by planting Douglas-fir or ponderosa pine seedlings on these soils. The droughtiness of the upper 24 inches reduces the seedling survival rate, especially on south- and southwest-facing slopes. Loose surface material may move down the slope and reduce the seedling survival rate on these soils. Plant competition is a concern affecting the production of timber on this unit, especially in areas of the Casabonne soil. When openings are made in the canopy, invading brushy plants that are not controlled can prevent the establishment of seedlings. Carefully managing reforestation helps to control competition from undesirable plants and provides partial shade for seedlings. Reforestation can be accomplished by planting Douglas-fir or ponderosa pine seedlings. If seed trees are present, natural reforestation of cutover areas by conifers seldom occurs because of the predominance of tanoak on these soils.

Among the common forest understory plants are tanoak, poison oak, and California huckleberry.

The capability classification is IVe-1(5), nonirrigated.

165—Holohan-Hollowtree-Casabonne complex, 30 to 50 percent slopes

This map unit is on hills and mountains. The vegetation is mainly tanoak and Douglas-fir. Elevation ranges from 500 to 4,000 feet. The average annual precipitation is 60 to 80 inches, the average annual air temperature is about 55 degrees F, and the average frost-free period is 150 to 250 days.

This unit is about 55 percent Holohan extremely gravelly sandy loam, 20 percent Hollowtree gravelly sandy loam, and 15 percent Casabonne gravelly loam. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Wohly soils and small areas of soils that have been altered by skid trails, landings, and roads. Also included are small areas that have slopes of 15 to 30 percent or 50 to 75 percent. Included areas make up about 10 percent of the total acreage of the unit. The percentage varies from one area to another.

The Holohan soil is very deep and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of litter about 4 inches thick. The surface layer is light gray extremely gravelly sandy loam about 4 inches thick. The upper 8 inches of the subsoil is very pale brown very gravelly loam. The next 5 inches is very pale brown extremely gravelly loam. The lower part of the subsoil to a depth of 74 inches or more is very pale brown extremely gravelly loamy sand. In some areas the surface layer is very gravelly loam.

Permeability is moderate in the Holohan soil. Available water capacity is low. The effective rooting depth is 60 inches or more. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

The Hollowtree soil is moderately deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of litter in a gravel mulch about 2 inches thick. The surface layer is light yellowish brown gravelly sandy loam about 6 inches thick. The upper 11 inches of the subsoil is very pale brown very gravelly loam. The lower 21 inches is very pale brown and yellow very gravelly sandy clay loam. Hard, fractured sandstone is at a depth of about 38 inches. In some areas the surface layer is very gravelly sandy loam or extremely gravelly sandy loam.

Permeability is moderate in the Hollowtree soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

The Casabonne soil is deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1/2 inch thick. The surface layer is brown gravelly loam about 11 inches thick. The upper 25 inches of the subsoil is brown clay loam. The lower 13 inches is reddish yellow gravelly clay loam. Hard, fractured sandstone is at a depth of about 49 inches.

Permeability is moderate in the Casabonne soil. Available water capacity is moderate or high. The effective rooting depth is limited by bedrock at a depth of 40 to 60 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

This unit is used mainly for timber and firewood production. It is also used as watershed.

Tanoak, interior live oak, Douglas-fir, and Pacific madrone are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 132 on the Holohan soil, 106 on the Hollowtree soil, and 144 on the Casabonne soil. The potential annual production from a fully stocked stand of Douglas-fir is 550 board feet per acre on the Holohan soil, 310 board feet per acre on the Hollowtree soil, and 665 board feet per acre on the Casabonne soil.

The main limitation affecting the harvesting of timber is the slope. Wheeled and tracked equipment can be used in the more gently sloping areas, but cable yarding systems generally cause less disturbance of the soil in the steeper areas. Disturbance of the protective layer of duff can be minimized by the careful use of either wheeled and tracked equipment or cable yarding systems. Revegetation of exposed subsoil is difficult on the Holohan and Hollowtree soils; however, it generally is not needed for control of surface erosion because of the large amount of coarse fragments. Establishing plant cover on steep cut and fill slopes reduces the hazard of erosion on the Casabonne soil. Rock for construction of roads is generally available in areas of this unit. Rocks and loose soil material may slide onto roads. This hazard increases the need for road maintenance.

Seedling establishment is a concern affecting the production of timber on the Holohan and Hollowtree soils. Reforestation can be accomplished by planting Douglas-fir or ponderosa pine seedlings on these soils. The droughtiness of the upper 24 inches reduces the seedling survival rate, especially on

south- and southwest-facing slopes. Loose surface material may move down the slope and reduce the seedling survival rate on these soils. Plant competition is a concern affecting the production of timber on this unit, especially in areas of the Casabonne soil. When openings are made in the canopy, invading brushy plants that are not controlled can prevent the establishment of seedlings. Carefully managing reforestation helps to control competition from undesirable plants and provides partial shade for seedlings. Reforestation can be accomplished by planting Douglas-fir or ponderosa pine seedlings. If seed trees are present, natural reforestation of cutover areas by conifers seldom occurs because of the predominance of tanoak on these soils.

Among the common forest understory plants are tanoak, poison oak, and California huckleberry.

The capability classification is VIe(5), nonirrigated.

166—Hopland loam, 30 to 50 percent slopes

This well drained soil is moderately deep to weathered bedrock. It is on hills and mountains. It formed in material derived from sandstone. The vegetation is mainly hardwoods. Elevation ranges from 200 to 2,500 feet. The average annual precipitation is 45 to 60 inches, the average annual air temperature is about 56 degrees F, and the average frost-free period is 150 to 250 days.

Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is yellowish brown loam about 15 inches thick. The subsoil is reddish yellow loam about 15 inches thick. Soft sandstone bedrock is at a depth of about 30 inches.

Included with this soil in mapping are small areas of Squawrock, Bearwallow, Witherell, Garcia, Wohly, and Casabonne soils. Also included are small areas that have slopes of 15 to 30 percent or 50 to 75 percent. Included areas make up about 20 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is moderately slow in the Hopland soil. Available water capacity is low. The effective rooting depth is limited by weathered bedrock at a depth of 20 to 40 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

This unit is used for firewood production, wildlife habitat, or watershed.

California black oak, Pacific madrone, and interior live oak are the main tree species on this soil. On the basis of a 50-year site curve, the mean site index is 44 for California black oak. The soil can produce about 30 to 35 cords per acre from a stand of trees 50 years old. Trees of limited extent include canyon live oak.

The main limitations affecting the harvesting of firewood are the slope, the hazard of erosion, and seasonal wetness. Wheeled and tracked equipment can be used in the more gently sloping areas, but cable yarding systems generally cause less disturbance of the soil in the steeper areas. Disturbance of the protective layer of duff can be minimized by the careful use of either wheeled and tracked equipment or cable yarding systems. Unless adequate plant cover or water bars are provided, steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying. Establishing plant cover on steep cut and fill slopes reduces the hazard of surface erosion. Using wheeled and tracked equipment when the soil is wet produces ruts, compacts the surface, and can damage the roots of trees. Roads on this unit are dusty when dry. Surface treatment may be desirable during periods of heavy use. Unsurfaced roads and skid trails are slippery when wet. They may be impassable during rainy periods. Suitable surfacing of roads is needed for use during wet seasons. Rock for construction of roads generally is not available in areas of this unit.

After they are cut, hardwoods can regenerate by sprouting. Regrowth is most successful if cutting is done between December and May.

Among the common forest understory plants are blue wildrye and melic grass.

The capability classification is VIe(5), nonirrigated.

167—Hopland loam, 50 to 75 percent slopes

This well drained soil is moderately deep to weathered bedrock. It is on hills and mountains. It formed in material derived from sandstone. The vegetation is mainly hardwoods. Elevation ranges from 200 to 2,500 feet. The average annual precipitation is 45 to 60 inches, the average annual air temperature is about 56 degrees F, and the average frost-free period is 150 to 250 days.

Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is yellowish brown and light yellowish brown loam about 15 inches thick. The subsoil is reddish yellow loam about 15 inches thick. Soft sandstone bedrock is at a depth of about 30 inches.

Included with this soil in mapping are small areas of Squawrock, Witherell, Bearwallow, Garcia, Wohly, and Casabonne soils. Also included are small areas

that have slopes of 30 to 50 percent or 75 to 99 percent. Included areas make up about 20 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is moderately slow in the Hopland soil. Available water capacity is low. The effective rooting depth is limited by weathered bedrock at a depth of 20 to 40 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

This unit is used as watershed, as wildlife habitat, or for limited firewood production.

California black oak, Pacific madrone, and interior live oak are the main tree species on this soil. On the basis of a 50-year site curve, the mean site index is 44 for California black oak. The soil can produce about 30 to 35 cords per acre from a stand of trees 50 years old. Trees of limited extent include canyon live oak.

The main limitations affecting the harvesting of firewood are the slope, the hazard of erosion, and seasonal wetness. Roads are dusty when dry. Surface treatment may be desirable during periods of heavy use. Unsurfaced roads and skid trails are slippery when wet. They may be impassable during rainy periods. Rock for construction of roads is generally not available in areas of this unit. Establishing plant cover on steep cut and fill slopes reduces the hazard of surface erosion. Roads may fail and landslides may occur following deep soil disturbance.

Among the common forest understory plants are blue wildrye and melic grass.

The capability classification is VIIe(5), nonirrigated.

168—Hopland-Squawrock association, 50 to 75 percent slopes

This map unit is on hills and mountains. The vegetation is mainly hardwoods on the Hopland soil and annual grasses and forbs on the Squawrock soil. Elevation ranges from 500 to 2,500 feet. The average annual precipitation is 45 to 60 inches, the average annual air temperature is about 56 degrees F, and the average frost-free period is 150 to 250 days.

This unit is about 40 percent Hopland loam and 35 percent Squawrock gravelly loam.

Included with these soils in mapping are small areas of Bearwallow, Witherell, Wohly, and Casabonne soils and areas of Rock outcrop. Also included are small areas that have slopes of 30 to 50 percent or 75 to 99 percent. Included areas make up about 25 percent of the total acreage of the unit. The percentage varies from one area to another.

The Hopland soil is moderately deep to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is yellowish brown loam about 15 inches thick. The subsoil is reddish yellow loam about 15 inches thick. Soft sandstone bedrock is at a depth of about 30 inches.

Permeability is moderately slow in the Hopland soil. Available water capacity is low. The effective rooting depth is limited by weathered bedrock at a depth of 20 to 40 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

The Squawrock soil is moderately deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface layer is pale brown gravelly loam about 7 inches thick. The upper 11 inches of the subsoil is pale brown very gravelly loam. The lower 14 inches is very pale brown very gravelly clay loam. Hard, fractured sandstone is at a depth of about 32 inches. In some areas the surface layer is loam.

Permeability is moderate in the Squawrock soil. Available water capacity is low. The effective rooting depth is limited by weathered bedrock at a depth of 20 to 40 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

The Hopland soil is used for limited firewood production, and the Squawrock soil is used for livestock grazing. This unit is also used as wildlife habitat or watershed.

The characteristic plant community on the Squawrock soil is mainly wild oat, soft chess, and filaree. The main limitations affecting range management are the slope and the low available water capacity. The slope limits access by livestock and results in overgrazing of the less sloping areas. Fencing, water development, and the strategic location of salt blocks can improve the distribution of livestock. The production of forage on the Squawrock soil is limited by the low amount of moisture available for plant growth. If seeding is considered, species that are tolerant of droughty conditions should be selected.

California black oak, Pacific madrone, and interior live oak are the main tree species on the Hopland soil. On the basis of a 50-year site curve, the mean site index for California black oak is 44. The Hopland

soil can produce about 30 to 35 cords per acre from a stand of trees 50 years old. Trees of limited extent include canyon live oak.

The main limitations affecting the harvesting of firewood are the slope, the hazard of erosion, and seasonal wetness. Roads may fail and landslides may occur following deep soil disturbance. Unsurfaced roads are slippery when wet. They may be impassable during rainy periods. Rock for construction of roads is generally not available in areas of this unit. Establishing plant cover on steep cut and fill slopes reduces the hazard of surface erosion on the Hopland soil. Revegetation of cut and fill slopes is difficult on the Squawrock soil because of the low available water capacity. Stands of hardwoods commonly are small and widely scattered. The harvesting of trees is generally not feasible in areas of this unit.

Among the common forest understory plants are blue wildrye, melic grass, and soft chess.

The capability classification is VIIe(15), nonirrigated.

169—Hopland-Witherell-Squawrock complex, 30 to 50 percent slopes

This map unit is on hills and mountains. The vegetation is mainly hardwoods on the Hopland soil and annual grasses and forbs on the Witherell and Squawrock soils. Elevation ranges from 500 to 2,500 feet. The average annual precipitation is 45 to 60 inches, the average annual air temperature is about 56 degrees F, and the average frost-free period is 150 to 250 days.

This unit is about 35 percent Hopland loam, 30 percent Witherell loam, and 20 percent Squawrock gravelly loam. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Bearwallow, Yorkville, Wohly, and Casabonne soils and areas of Rock outcrop. Also included are small areas that have slopes of 15 to 30 percent or 50 to 75 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

The Hopland soil is moderately deep to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is yellowish brown loam about 15 inches thick. The subsoil is reddish yellow loam about 15 inches thick. Soft sandstone bedrock is at a depth of about 30 inches.

Permeability is moderately slow in the Hopland soil. Available water capacity is low. The effective rooting depth is limited by weathered bedrock at a depth of 20 to 40 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

The Witherell soil is shallow to bedrock and is somewhat excessively drained. It formed in material derived dominantly from sandstone. Typically, the surface layer is brown loam about 1 inch thick. The subsoil is light yellowish brown loam about 11 inches thick. Hard, fractured sandstone is at a depth of about 12 inches. In some areas the surface layer is gravelly loam.

Permeability is moderate in the Witherell soil. Available water capacity is very low. The effective rooting depth is limited by bedrock at a depth of 10 to 20 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

The Squawrock soil is moderately deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface layer is pale brown gravelly loam about 7 inches thick. The upper 11 inches of the subsoil is pale brown very gravelly loam. The lower 14 inches is very pale brown very gravelly clay loam. Hard, fractured sandstone is at a depth of about 32 inches. In some areas the surface layer is loam.

Permeability is moderate in the Squawrock soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

The Hopland soil is used for firewood production, and the Witherell and Squawrock soils are used for livestock grazing. This unit is also used as wildlife habitat or watershed.

The characteristic plant community on the Witherell soil is mainly soft chess, filaree, and wild oat. The main limitations affecting range management on this soil are the slope and the effective rooting depth. The slope limits access by livestock and results in overgrazing of the less sloping areas. Fencing, water development, and the strategic location of salt blocks can improve the distribution of livestock. The production of forage on the Witherell soil is limited by the shallow effective rooting depth. If seeding is considered, species that are tolerant of droughty conditions should be selected.

The characteristic plant community on the Squawrock soil is mainly wild oat, soft chess, and

broadleaf filaree. The main limitations affecting range management on this soil are the slope and the low available water capacity. The slope limits access by livestock and results in overgrazing of the less sloping areas. Fencing, water development, and the strategic location of salt blocks can improve the distribution of livestock. The production of forage on the Squawrock soil is limited by the amount of moisture available for plant growth. If seeding is considered, species that are tolerant of droughty conditions should be selected.

California black oak, Pacific madrone, and interior live oak are the main tree species on the Hopland soil. On the basis of a 50-year site curve, the mean site index for California black oak is 44. The Hopland soil can produce about 30 to 35 cords per acre from a stand of trees 50 years old. Trees of limited extent include canyon live oak.

The main limitations affecting the harvesting of firewood are the slope, the hazard of erosion, and seasonal wetness. Wheeled and tracked equipment can be used in the more gently sloping areas, but cable yarding systems generally cause less disturbance of the soil in the steeper areas. Disturbance of the protective layer of duff can be minimized by the careful use of either wheeled and tracked equipment or cable yarding systems. Unless adequate plant cover or water bars are provided, steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying. Establishing plant cover on steep cut and fill slopes reduces the hazard of surface erosion. Using wheeled and tracked equipment when the soils are wet produces ruts, compacts the surface, and can damage the roots of trees. Roads on this unit are dusty when dry. Surface treatment may be desirable during periods of heavy use. Unsurfaced roads and skid trails are slippery when wet. They may be impassable during rainy periods. Suitable surfacing of roads is needed for use during wet seasons. Rock for construction of roads generally is available in areas of this unit. Revegetation of cut and fill slopes is difficult on the Squawrock soil because of the low available water capacity.

After they are cut, hardwoods can regenerate by sprouting. Regrowth is most successful if cutting is done between December and May.

Among the common forest understory plants are blue wildrye, melic grass, and soft chess.

The capability classification is VIe(15), nonirrigated.

170—Hopland-Wohly complex, 30 to 50 percent slopes

This map unit is on hills and mountains. The vegetation is mainly hardwoods. Scattered pockets of Douglas-fir also occur on the Wohly soil. Elevation ranges from 300 to 2,500 feet. The average annual precipitation is 45 to 60 inches, the average annual air temperature is about 56 degrees F, and the average frost-free period is 150 to 250 days.

This unit is about 60 percent Hopland loam and 20 percent Wohly loam. The Hopland and Wohly soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Squawrock, Bearwallow, Witherell, Garcia, and Casabonne soils. Also included are small areas that have slopes of 15 to 30 percent or 50 to 75 percent. Included areas make up about 20 percent of the total acreage of the unit. The percentage varies from one area to another.

The Hopland soil is moderately deep to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is yellowish brown loam about 15 inches thick. The subsoil is reddish yellow loam about 15 inches thick. Soft sandstone bedrock is at a depth of about 30 inches.

Permeability is moderately slow in the Hopland soil. Available water capacity is low or moderate. The effective rooting depth is 20 to 40 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

The Wohly soil is moderately deep to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1/2 inch thick. The surface layer is pale brown loam about 4 inches thick. The upper 6 inches of the subsoil is light yellowish brown and strong brown loam. The next 16 inches is variegated very pale brown and reddish yellow clay loam. The lower 5 inches of the subsoil is very pale brown gravelly clay loam. Soft, fractured sandstone is at a depth of about 31 inches.

Permeability is moderate in the Wohly soil. Available water capacity is low. The effective rooting depth is limited by weathered bedrock at a depth of 20 to 40 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

This unit is used for firewood production, wildlife habitat, or watershed. A few areas of the Wohly soil are used for limited timber production.

California black oak, Pacific madrone, and interior live oak are the main tree species on the Hopland soil. On the basis of a 50-year site curve, the mean site index is 44 for California black oak on the Hopland soil. This soil can produce about 30 to 35 cords per acre from a stand of trees 50 years old. Trees of limited extent include canyon live oak.

Douglas-fir, California black oak, and Pacific madrone are the main tree species on the Wohly soil. On the basis of a 100-year site curve, the mean site index is 118 for Douglas-fir on the Wohly soil. Stands of conifers commonly are small and widely scattered; thus, they generally are not of commercial value. Estimates of the potential annual production for Douglas-fir have not been made. Trees of limited extent include tanoak and interior live oak.

The main limitations affecting the harvesting of firewood and timber are the slope, the hazard of erosion, seasonal wetness, and the low volume of commercial species. Wheeled and tracked equipment can be used in the more gently sloping areas, but cable yarding systems generally cause less disturbance of the soil in the steeper areas. Disturbance of the protective layer of duff can be minimized by the careful use of either wheeled and tracked equipment or cable yarding systems. Unless adequate plant cover or water bars are provided, steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying. Establishing plant cover on steep cut and fill slopes reduces the hazard of surface erosion. Using wheeled and tracked equipment when the soils are wet produces ruts, compacts the surface, and can damage the roots of trees. Roads on this unit are dusty when dry. Surface treatment may be desirable during periods of heavy use. Unsurfaced roads and skid trails are slippery when wet. They may be impassable during rainy periods. Suitable surfacing of roads is needed for use during wet seasons. Rock for construction of roads generally is not available in areas of this unit.

Seedling mortality is a concern affecting the production of timber. Reforestation can be accomplished by planting Douglas-fir and ponderosa pine seedlings on the Wohly soil. The high soil temperature and low content of soil moisture during the growing season result in a high seedling mortality rate, especially on south- and southwest-facing slopes. After they are cut, hardwoods can regenerate by sprouting. Regrowth is most successful if cutting is done between December and May.

Among the common forest understory plants are blue wildrye, melic grass, and soft chess.

The capability classification is VIe(5), nonirrigated.

171—Hopland-Wohly complex, 50 to 75 percent slopes

This map unit is on hills and mountains. The vegetation is mainly hardwoods. Scattered pockets of Douglas-fir also occur on the Wohly soil. Elevation ranges from 300 to 2,500 feet. The average annual precipitation is 45 to 60 inches, the average annual air temperature is about 56 degrees F, and the average frost-free period is 150 to 250 days.

This unit is about 65 percent Hopland loam and 15 percent Wohly loam. The Hopland and Wohly soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Squawrock, Witherell, Bearwallow, Garcia, and Casabonne soils. Also included are small areas that have slopes of 30 to 50 percent or 75 to 99 percent. Included areas make up about 20 percent of the total acreage of the unit. The percentage varies from one area to another.

The Hopland soil is moderately deep to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is yellowish brown loam about 15 inches thick. The subsoil is reddish yellow loam about 15 inches thick. Soft sandstone bedrock is at a depth of about 30 inches.

Permeability is moderately slow in the Hopland soil. Available water capacity is low. The effective rooting depth is limited by weathered bedrock at a depth of 20 to 40 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

The Wohly soil is moderately deep to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about $^{1}/_{2}$ inch thick. The surface layer is pale brown loam about 4 inches thick. The upper 6 inches of the subsoil is light yellowish brown and strong brown loam. The next 16 inches is very pale brown and reddish yellow clay loam. The lower 5 inches of the subsoil is very pale brown gravelly clay loam. Soft, fractured sandstone is at a depth of about 31 inches.

Permeability is moderate in the Wohly soil.

Available water capacity is low. The effective rooting depth is limited by weathered bedrock at a depth of 20 to 40 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

This unit is used as watershed, as wildlife habitat, or for limited firewood production. A few areas of the Wohly soil are used for limited timber production.

California black oak, Pacific madrone, and interior live oak are the main tree species on the Hopland soil. On the basis of a 50-year site curve, the mean site index is 44 for California black oak on the Hopland soil. This soil can produce about 30 to 35 cords per acre from a stand of trees 50 years old. Trees of limited extent include California bay and canyon live oak.

Douglas-fir, California black oak, and Pacific madrone are the main tree species on the Wohly soil. On the basis of a 100-year site curve, the mean site index is 118 for Douglas-fir on the Wohly soil. Stands of conifers commonly are small and widely scattered; thus, they generally are not of commercial value. Estimates of the potential annual production for Douglas-fir have not been made. Trees of limited extent include tanoak and interior live oak.

The main limitations affecting the harvesting of firewood and timber are the slope, the hazard of erosion, and seasonal wetness. When timber is harvested, the slope limits the use of wheeled and tracked equipment in skidding operations. Cable yarding systems generally cause less disturbance of the soil. Unless adequate plant cover or water bars are provided, steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying. Harvesting systems that lift logs entirely off the ground minimize the disturbance of the protective layer of duff. Establishing plant cover on steep cut and fill slopes reduces the hazard of surface erosion. Roads may fail and landslides may occur following deep soil disturbance in the steeper areas. Roads are dusty when dry. Surface treatment may be desirable during periods of heavy use. Unsurfaced roads and skid trails are slippery when wet. They may be impassable during rainy periods. Suitable surfacing of roads is needed for use during wet seasons. Rock for construction of roads generally is not available in areas of this unit. Harvesting of trees is generally not feasible.

Reforestation can be accomplished by planting Douglas-fir and ponderosa pine seedlings on the Wohly soil. The high soil temperature and low content of soil moisture during the growing season result in a high seedling mortality rate, especially on south- and southwest-facing slopes. After they are cut, hardwoods can regenerate by sprouting. Regrowth is most successful if cutting is done between December and May.

Among the common forest understory plants are blue wildrye and melic grass.

The capability classification is VIIe(5), nonirrigated.

172—Irmulco-Tramway complex, 9 to 30 percent slopes

This map unit is on hills. The vegetation is mainly redwood and Douglas-fir. Elevation ranges from 10 to 800 feet. The average annual precipitation is 40 to 70 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 290 to 365 days.

This unit is about 60 percent Irmulco loam and 15 percent Tramway loam. The Irmulco and Tramway soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Vandamme soils and soils that have been altered by skid trails, landings, and roads. Also included are small areas that have slopes of 5 to 9 percent or 30 to 50 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

The Irmulco soil is very deep and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is pale brown loam about 6 inches thick. The upper 35 inches of the subsoil is light brown loam. The lower 20 inches is light brown, pink, and reddish yellow clay loam. Soft sandstone bedrock is at a depth of about 61 inches.

Permeability is moderate in the Irmulco soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Surface runoff is medium or rapid, and the hazard of water erosion is moderate if the surface is left bare.

The Tramway soil is moderately deep to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 2 inches thick. The surface layer is light brownish gray loam about 7 inches thick. The upper 5 inches of the subsoil is pale brown loam. The lower 16 inches is light yellowish brown clay loam. Soft, fractured sandstone is at a depth of about 28 inches.

Permeability is moderate in the Tramway soil.

Available water capacity is low. The effective rooting depth is limited by weathered bedrock at a depth of 20 to 40 inches. Surface runoff is medium or rapid, and the hazard of water erosion is moderate if the surface is left bare.

This unit is used for timber production or as watershed.

Redwood and Douglas-fir are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index for redwood is 165 on the Irmulco soil and 141 on the Tramway soil. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 191 on the Irmulco soil and 161 on the Tramway soil. The potential annual production from a fully stocked stand of redwood is 1,545 board feet per acre on the Irmulco soil and 1,130 board feet per acre on the Tramway soil. Trees of limited extent include tanoak, grand fir, Pacific madrone, western hemlock, and red alder.

The main limitation affecting the harvesting of timber is seasonal wetness. Using wheeled and tracked equipment when the soils are wet produces ruts, compacts the surface, and can damage the roots of trees. Disturbance of the protective layer of duff can be minimized by the careful use of wheeled and tracked equipment. Roads on this unit are dusty when dry. Surface treatment may be desirable during periods of heavy use. Unsurfaced roads and skid trails are slippery when wet. They may be impassable during rainy periods. Suitable surfacing of roads is needed for use during wet seasons. Rock for construction of roads generally is not available in areas of this unit.

Plant competition is a concern affecting the production of timber. When openings are made in the canopy, invading brushy plants that are not controlled can delay the establishment of seedlings. Reforestation can be accomplished by planting redwood and Douglas-fir seedlings. Natural reforestation by redwood sprouts and Douglas-fir seed trees provides variable stocking results. Both overstocked and understocked areas are common.

Among the common forest understory plants are swordfern, rhododendron, California huckleberry, and oxalis.

The capability classification is IVe-1(4), nonirrigated.

173—Irmulco-Tramway complex, 30 to 50 percent slopes

This map unit is on steep hills. The vegetation is mainly redwood and Douglas-fir. Elevation ranges from 10 to 800 feet. The average annual precipitation is 40 to 70 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 290 to 365 days.

This unit is about 70 percent Irmulco loam and 15 percent Tramway loam. The Irmulco and Tramway soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Vandamme, Dehaven, and Hotel soils and small areas of soils that have been altered by skid trails, landings, and roads. Also included are small areas that have slopes of 15 to 30 percent or 50 to 75 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

The Irmulco soil is very deep and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is pale brown loam about 6 inches thick. The upper 35 inches of the subsoil is light brown loam. The lower 20 inches is light brown, pink, and reddish yellow clay loam. Soft sandstone bedrock is at a depth of about 61 inches.

Permeability is moderate in the Irmulco soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

The Tramway soil is moderately deep to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 2 inches thick. The surface layer is light brownish gray loam about 7 inches thick. The upper 5 inches of the subsoil is pale brown loam. The lower 16 inches is light yellowish brown clay loam. Soft, fractured sandstone is at a depth of about 28 inches.

Permeability is moderate in the Tramway soil. Available water capacity is low. The effective rooting depth is limited by weathered bedrock at a depth of 20 to 40 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

This unit is used for timber production or as watershed.

Redwood and Douglas-fir are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index for redwood is 165 on the Irmulco soil and 141 on the Tramway soil. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 191 on the Irmulco soil and 161 on

the Tramway soil. The potential annual production from a fully stocked stand of redwood is 1,545 board feet per acre on the Irmulco soil and 1,130 board feet per acre on the Tramway soil. Trees of limited extent include tanoak, grand fir, Pacific madrone, western hemlock, and red alder.

The main limitations affecting the harvesting of timber are the slope, the hazard of erosion, and seasonal wetness. Wheeled and tracked equipment can be used in the more gently sloping areas, but cable yarding systems generally cause less disturbance of the soil in the steeper areas. Disturbance of the protective layer of duff can be minimized by the careful use of either wheeled and tracked equipment or cable yarding systems. Unless adequate plant cover or water bars are provided, steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying. Establishing plant cover on steep cut and fill slopes reduces the hazard of surface erosion. Using wheeled and tracked equipment when the soil is wet produces ruts, compacts the surface, and can damage the roots of trees. Roads on this unit are dusty when dry. Surface treatment may be desirable during periods of heavy use. Unsurfaced roads and skid trails are slippery when wet. They may be impassable during rainy periods. Suitable surfacing of roads is needed for use during wet seasons. Rock for construction of roads generally is not available in areas of this unit.

Plant competition is a concern affecting the production of timber. When openings are made in the canopy, invading brushy plants that are not controlled can delay the establishment of seedlings. Reforestation can be accomplished by planting redwood and Douglas-fir seedlings. Natural reforestation by redwood sprouts and Douglas-fir seed trees provides variable stocking results. Both overstocked and understocked areas are common.

Among the common forest understory plants are swordfern, rhododendron, California huckleberry, and oxalis.

The capability classification is VIe(4), nonirrigated.

174—Irmulco-Tramway complex, 50 to 75 percent slopes

This map unit is on hills. The vegetation is mainly redwood and Douglas-fir. Elevation ranges from 10 to 800 feet. The average annual precipitation is 40 to 70 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 290 to 365 days.

This unit is about 45 percent Irmulco loam and 35 percent Tramway loam. The Irmulco and Tramway soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Vandamme, Dehaven, and Hotel soils and small areas of soils that have been altered by skid trails, landings, and roads. Also included are small areas that have slopes of 30 to 50 percent or 75 to 99 percent. Included areas make up about 20 percent of the total acreage of the unit. The percentage varies from one area to another.

The Irmulco soil is deep to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is pale brown loam about 6 inches thick. The subsoil is light brown, pink, and reddish yellow loam about 54 inches thick. Soft, fractured sandstone is at a depth of about 60 inches.

Permeability is moderate in the Irmulco soil. Available water capacity is high. The effective rooting depth is limited by weathered bedrock at a depth of 40 to 60 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

The Tramway soil is moderately deep to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 2 inches thick. The surface layer is light brownish gray loam about 7 inches thick. The upper 5 inches of the subsoil is pale brown loam. The lower 16 inches is light yellowish brown clay loam. Soft sandstone bedrock is at a depth of about 28 inches.

Permeability is moderate in the Tramway soil. Available water capacity is low. The effective rooting depth is limited by weathered bedrock at a depth of 20 to 40 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

This unit is used for timber production or as watershed.

Redwood and Douglas-fir are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index for redwood is 165 on the Irmulco soil and 141 on the Tramway soil. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 191 on the Irmulco soil and 161 on the Tramway soil. The potential annual production from a fully stocked stand of redwood is 1,545 board feet per acre on the Irmulco soil and 1,130 board feet

per acre on the Tramway soil. Trees of limited extent include tanoak, grand fir, Pacific madrone, western hemlock, and red alder.

The main limitations affecting the harvesting of timber are the slope, the hazard of erosion, and seasonal wetness. When timber is harvested, the slope limits the use of wheeled and tracked equipment in skidding operations. Cable yarding systems generally cause less disturbance of the soil. Unless adequate plant cover or water bars are provided, steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying. Harvesting systems that lift logs entirely off the ground minimize the disturbance of the protective layer of duff. Establishing plant cover on steep cut and fill slopes reduces the hazard of surface erosion. Roads may fail and landslides may occur following deep soil disturbance in the steeper areas. Roads are dusty when dry. Surface treatment may be desirable during periods of heavy use. Unsurfaced roads and skid trails are slippery when wet. They may be impassable during rainy periods. Suitable surfacing of roads is needed for use during wet seasons. Rock for construction of roads generally is not available in areas of this unit.

Plant competition is a concern affecting the production of timber. When openings are made in the canopy, invading brushy plants that are not controlled can delay the establishment of seedlings. Reforestation can be accomplished by planting redwood and Douglas-fir seedlings. Natural reforestation by redwood sprouts and Douglas-fir seed trees provides variable stocking results. Both overstocked and understocked areas are common.

Among the common forest understory plants are swordfern, rhododendron, California huckleberry, and oxalis.

The capability classification is VIIe(4), nonirrigated.

175—Iversen loam, 2 to 15 percent slopes

This well drained soil is moderately deep to weathered bedrock. It is on ridgetops and the upper side slopes of coastal hills and mountains. It formed in material derived from sandstone and shale. The vegetation is mainly Douglas-fir and redwood. Elevation ranges from 600 to 1,300 feet. The average annual precipitation is 45 to 55 inches, the average annual air temperature is about 54 degrees F, and the average frost-free period is 250 to 320 days.

Typically, the surface is covered with a mat of litter about 1 inch thick. The surface layer is yellowish brown and light brown loam about 7 inches thick. The upper 15 inches of the subsoil is reddish yellow clay. The lower 15 inches is strong brown gravelly clay. Soft, fractured, interlayered sandstone and shale bedrock is at a depth of about 37 inches.

Included with this soil in mapping are small areas of Threechop soils, areas of shallow soils, and soils that have a subsoil of loam. Also included are small areas that have slopes of 15 to 30 percent. Included areas make up about 25 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is slow in the Iversen soil. Available water capacity is moderate. The effective rooting depth is limited by weathered bedrock at a depth of 20 to 40 inches. Surface runoff is slow or medium, and the hazard of water erosion is slight or moderate if the surface is left bare.

This unit is used for homesite development, timber production, or watershed.

The main limitations affecting homesite development are the slope, low strength, the moderate depth to bedrock, and the slow permeability in the subsoil. Excavations for roads and buildings increase the hazard of erosion. Revegetating disturbed areas around construction sites as soon as possible helps to control erosion. The design of access roads should control surface runoff and help to stabilize cut slopes. The design of buildings and roads should offset the limited ability of the soil to support a load. The moderate depth to bedrock and the restricted permeability increase the possibility of failure of septic tank absorption fields. Alternative systems may be needed, such as those in which leach lines are placed in a mound above the soil surface.

Douglas-fir, redwood, and tanoak are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 87 and that for redwood is 127. The potential annual production from a fully stocked stand of Douglas-fir is 185 board feet per acre. Areas that are subject to strong, persistent winds, which limit tree height, are less productive than other areas of this unit. Trees of limited extent include Pacific madrone, chinkapin, and bishop pine.

The main limitation affecting the harvesting of timber is seasonal wetness. Using wheeled and tracked equipment when the soil is wet produces ruts, compacts the surface, and can damage the roots of trees. Disturbance of the protective layer of duff can be minimized by the careful use of wheeled and tracked equipment. Roads on this unit are dusty when dry. Surface treatment may be desirable during

periods of heavy use. Unsurfaced roads and skid trails are slippery when wet. They may be impassable during rainy periods. Suitable surfacing of roads is needed for use during wet seasons. Rock for construction of roads generally is not available in areas of this unit.

Plant competition and seedling establishment are concerns affecting the production of timber. When openings are made in the canopy, invading brushy plants that are not controlled can prevent the establishment of seedlings. Reforestation can be accomplished by planting Douglas-fir and redwood seedlings. The droughtiness of the upper 24 inches reduces the seedling survival rate, especially on south- and southwest-facing slopes. If seed trees are present, natural reforestation of cutover areas by Douglas-fir occurs infrequently. Redwood can regenerate by sprouting after cutting. These sprouts seldom provide optimum stocking.

Among the common forest understory plants are tanoak, brackenfern, salal, California huckleberry, and manzanita.

The capability classification is IIIe-1(4), nonirrigated.

176—Iversen loam, 15 to 30 percent slopes

This well drained soil is moderately deep to weathered bedrock. It is on ridgetops and the upper side slopes of coastal hills and mountains. It formed in material derived from sandstone and shale. The vegetation is mainly Douglas-fir and redwood. Elevation ranges from 600 to 1,300 feet. The average annual precipitation is 45 to 55 inches, the average annual air temperature is about 54 degrees F, and the average frost-free period is 250 to 320 days.

Typically, the surface is covered with a mat of Douglas-fir litter about 1 inch thick. The surface layer is yellowish brown and light brown loam about 7 inches thick. The upper 15 inches of the subsoil is reddish yellow clay. The lower 15 inches is strong brown gravelly clay. Soft, fractured, interlayered sandstone and shale bedrock is at a depth of about 37 inches.

Included with this soil in mapping are small areas of Threechop soils, shallow soils, and soils that have a subsoil of loam. Also included are small areas that have slopes of 9 to 15 percent or 30 to 50 percent. Included areas make up about 25 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is slow in the Iversen soil. Available water capacity is moderate. The effective rooting depth is limited by weathered bedrock at a depth of 20 to 40 inches. Surface runoff is rapid, and the hazard of water erosion is moderate if the surface is left bare.

This unit is used for homesite development or timber production.

The main limitations affecting homesite development are the slope, low strength, the moderate depth to bedrock, and the slow permeability of the subsoil. The most favorable building sites are in the less sloping areas. Excavations for roads and buildings increase the hazard of erosion. Revegetating disturbed areas as soon as possible helps to control erosion. The design of access roads should control surface runoff and help to stabilize cut slopes. The design of buildings and roads should offset the limited ability of the soil to support a load. The moderate depth to bedrock and the restricted permeability increase the possibility of failure of septic tank absorption fields. The slope is also a concern affecting the installation of septic tank absorption fields. Alternative systems may be needed.

Douglas-fir, redwood, and tanoak are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index is 87 for Douglas-fir and 127 for redwood. The potential annual production from a fully stocked stand of Douglas-fir is 185 board feet per acre. Areas that are subject to strong, persistent winds, which limit tree height, are less productive than other areas of this unit. Trees of limited extent include Pacific madrone, chinkapin, and bishop pine.

The main limitation affecting the harvesting of timber is seasonal wetness. Using wheeled and tracked equipment when the soil is wet produces ruts, compacts the surface, and can damage the roots of trees. Disturbance of the protective layer of duff can be minimized by the careful use of equipment. Roads on this unit are dusty when dry. Surface treatment may be desirable during periods of heavy use. Unsurfaced roads and skid trails are slippery when wet. They may be impassable during rainy periods. Suitable surfacing of roads is needed for use during wet seasons. Rock for construction of roads is generally not available in areas of this unit.

Plant competition and seedling establishment are concerns affecting the production of timber. When openings are made in the canopy, invading brushy plants that are not controlled can prevent the establishment of seedlings. Reforestation can be accomplished by planting Douglas-fir and redwood seedlings. The droughtiness of the upper 24 inches reduces the seedling survival rate, especially on

south- and southwest-facing slopes. If seed trees are present, natural reforestation of cutover areas by Douglas-fir occurs infrequently. Redwood can regenerate by sprouting after cutting. These sprouts seldom provide optimum stocking.

Among the common forest understory plants are tanoak, brackenfern, salal, California huckleberry, and manzanita.

The capability classification is IVe-1(4), nonirrigated.

177—Iversen sandy loam, 2 to 15 percent slopes

This well drained soil is moderately deep to weathered bedrock. It is on ridgetops and the upper side slopes of coastal hills and mountains. It formed in material derived from coarse grained sandstone. The vegetation is mainly Douglas-fir and redwood. Elevation ranges from 600 to 1,300 feet. The average annual precipitation is 45 to 55 inches, the average annual air temperature is about 54 degrees F, and the average frost-free period is 250 to 320 days.

Typically, the surface is covered with a mat of litter about 1 inch thick. The surface layer is light gray sandy loam about 7 inches thick. The upper 13 inches of the subsoil is strong brown clay. The lower 15 inches is brownish yellow clay loam. Soft sandstone bedrock is at a depth of about 35 inches.

Included with this soil in mapping are small areas of Havensneck soils, small areas of soils that are deep or very deep to bedrock, and soils that have a subsoil of loam. Also included are small areas that have slopes of 15 to 30 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is slow in the Iversen soil. Available water capacity is moderate. The effective rooting depth is limited by weathered bedrock at a depth of 20 to 40 inches. Surface runoff is slow or medium, and the hazard of water erosion is slight or moderate if the surface is left bare.

This unit is used for homesite development, for timber production, or as watershed.

The main limitations affecting homesite development are the slope, low strength, the moderate depth to bedrock, and the slow permeability of the subsoil. Excavations for roads and buildings increase the hazard of erosion. Revegetating disturbed areas around construction sites as soon as possible helps to control erosion. The design of access roads should control surface runoff and help to stabilize cut slopes. The design of buildings and roads should offset the limited ability of the soil to support a load. The moderate depth to bedrock and the restricted permeability increase the possibility of failure of septic tank absorption fields. Alternative systems may be needed, such as those in which leach lines are placed in a mound above the soil surface.

Douglas-fir, redwood, and tanoak are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index is 87 for Douglas-fir and 127 for redwood. The potential annual production from a fully stocked stand of Douglas-fir is 185 board feet per acre. Areas that are subject to strong, persistent winds, which limit tree height, are less productive than other areas of this unit. Trees of limited extent include Pacific madrone, chinkapin, and bishop pine.

The main limitations affecting the harvesting of timber are the erosion hazard and seasonal wetness. The surface layer is subject to sheet and rill erosion when exposed. Disturbance of the protective layer of duff can be minimized by the careful use of either wheeled and tracked equipment or cable yarding systems. Establishing plant cover on steep cut and fill slopes reduces the hazard of erosion. Another limitation is low bearing strength when the soil is saturated. Using wheeled and tracked equipment when the soil is wet produces ruts, compacts the surface, and can damage the roots of trees. Unsurfaced roads and skid trails are slippery and soft when wet. They may be impassable during rainy periods. The design of roads should offset the limited ability of the soil to support a load. Roads on this soil are dusty when dry. Surface treatment may be desirable during periods of heavy use. Rock for construction of roads is generally not available in areas of this unit.

Plant competition is a concern affecting the production of timber. When openings are made in the canopy, invading brushy plants that are not controlled can prevent the establishment of seedlings. The surface layer has a low capacity to hold nutrients and water. As a result, the establishment of seedlings may be difficult. Reforestation can be accomplished by planting Douglas-fir or redwood seedlings. If seed trees are present, natural reforestation of cutover areas by Douglas-fir occurs infrequently. Redwood can regenerate by sprouting after cutting. These sprouts seldom provide optimum stocking.

Among the common forest understory plants are tanoak, brackenfern, salal, California huckleberry, and manzanita.

The capability classification is IIIe-1(4), nonirrigated.

178—Kibesillah-Yellowhound complex, 75 to 99 percent slopes

This map unit is on hills and mountains. The vegetation is mainly Douglas-fir, redwood, and tanoak. Elevation ranges from 200 to 2,000 feet. The average annual precipitation is 50 to 70 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 220 to 320 days.

This unit is about 40 percent Kibesillah very gravelly loam and 35 percent Yellowhound gravelly loam. The Kibesillah and Yellowhound soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Rock outcrop and small areas of soils that have been altered by skid trails, landings, and roads. Also included are small areas that have slopes of 50 to 75 percent. Included areas make up about 25 percent of the total acreage of the unit. The percentage varies from one area to another.

The Kibesillah soil is moderately deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1/2 inch thick. The surface layer is pale brown very gravelly loam about 13 inches thick. The upper 6 inches of the subsoil is very pale brown very gravelly loam. The lower 7 inches is very pale brown extremely gravelly clay loam. Hard, fractured sandstone is at a depth of about 26 inches. In some areas the surface layer is gravelly loam.

Permeability is moderate in the Kibesillah soil. Available water capacity is very low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

The Yellowhound soil is deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is pale brown and light yellowish brown gravelly loam about 15 inches thick. The subsoil is light yellowish brown and pale brown extremely gravelly loam about 38 inches thick. Hard, fractured sandstone is at a depth of about 53 inches. In some areas the surface layer is gravelly sandy loam, sandy loam, or loam.

Permeability is moderate in the Yellowhound soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 40 to 60 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

This unit is used for timber production or as watershed.

Douglas-fir, redwood, and tanoak are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 109 on the Kibesillah soil and 140 on the Yellowhound soil. On the basis of a 100-year site curve, the mean site index for redwood is 109 on the Kibesillah soil and 135 on the Yellowhound soil. The potential annual production from a fully stocked stand of Douglas-fir is 335 board feet per acre on the Kibesillah soil and 630 board feet per acre on the Yellowhound soil. Trees of limited extent include Pacific madrone and canyon live oak.

The main limitations affecting the harvesting of timber are the slope and the hazard of erosion. Cable yarding systems generally are used on this unit. Harvesting systems that lift logs entirely off the ground minimize the disturbance of the protective layer of duff. Revegetation of exposed subsoil is difficult on this unit; however, it generally is not needed for control of surface erosion because of the large amount of coarse fragments. Roads may fail and landslides may occur following deep soil disturbance. Rock for construction of roads generally is available in areas of this unit. Rocks and loose soil material frequently slide onto roads. This hazard increases the need for road maintenance.

Seedling establishment is a concern affecting the production of timber. Droughtiness in the upper 24 inches reduces the seedling survival rate, especially on south- and southwest-facing slopes. Movement of loose surface material reduces the seedling survival rate. Reforestation can be accomplished by planting Douglas-fir seedlings. If seed trees are present, natural reforestation of cutover areas by Douglas-fir seldom occurs. Redwood can regenerate by sprouting after cutting. These sprouts seldom provide optimum stocking. Plant competition is an additional concern affecting the production of timber on the Yellowhound soil. When openings are made in the canopy, invading brushy plants that are not controlled can prevent the establishment of seedlings.

Among the common forest understory plants are canyon live oak, poison oak, and blueblossom ceanothus.

The capability classification is VIIe(4), nonirrigated.

179—Littlered clay loam, 2 to 9 percent slopes

This very deep, well drained soil is on mountains. It formed in material derived from ultrabasic intrusive rocks. The vegetation is mainly conifers and brush. Elevation ranges from 2,500 to 3,300 feet. The average annual precipitation is 60 to 70 inches, the average annual air temperature is about 55 degrees F, and the average frost-free period is 150 to 250 days.

Typically, the surface is covered with a mat of leaves and twigs about 1/2 inch thick. The surface layer is dark red clay loam about 10 inches thick. The subsoil is yellowish red clay loam about 16 inches thick. The substratum to a depth of 65 inches or more is strong brown loam.

Included with this soil in mapping are small areas of Dann and Hiltabidel soils and small areas that have slopes of 9 to 15 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is moderate in the Littlered soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Surface runoff is slow or medium, and the hazard of water erosion is slight or moderate if the surface is left bare.

This unit is used for wildlife habitat or as watershed. The soil has a chemical imbalance because of a low calcium-to-magnesium ratio. This imbalance restricts the growth of conifers.

The capability classification is VIe(5), nonirrigated.

180—Mackerricher sandy loam, 2 to 9 percent slopes

This very deep, somewhat excessively drained soil is on stabilized sand dunes. It formed in eolian sand. The vegetation is mainly redwood and grand fir. Elevation ranges from 175 to 700 feet. The average annual precipitation is 40 to 55 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 290 to 365 days.

Typically, the surface layer is dark brown and brown sandy loam about 12 inches thick. The subsoil is brown and strong brown loamy sand about 18 inches thick. The substratum to a depth of 62 inches or more is yellowish brown sand.

Included with this soil in mapping are small areas of Sirdrak soils and Tropaquepts and small areas that have slopes of 9 to 15 percent. Included areas make up about 20 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is moderately rapid in the Mackerricher soil. Available water capacity is low. The effective rooting depth is 60 inches or more. Surface runoff is slow or medium, and the hazard of water erosion is slight or moderate if the surface is left bare.

This unit is used for timber production, for homesite development, or as watershed.

Redwood, Douglas-fir, and grand fir are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index is 145 for redwood and 159 for Douglas-fir. The potential annual production from a fully stocked stand of redwood is 1,195 board feet per acre. Areas that are subject to strong, persistent winds, which limit tree height, are less productive than other areas of this unit. Trees of limited extent include bishop pine and tanoak.

The main limitation affecting the harvesting of timber is seasonal wetness. Using wheeled and tracked equipment when the soil is wet produces ruts, compacts the surface, and can damage the roots of trees. Disturbance of the protective layer of duff can be minimized by the careful use of wheeled and tracked equipment. Establishing plant cover on cut and fill slopes reduces the hazard of erosion. Rock for construction of roads generally is not available in areas of this unit.

Plant competition is a concern affecting the production of timber. When openings are made in the canopy, invading brushy plants that are not controlled can delay the establishment of seedlings. Because of the low available water capacity, the establishment of seedlings may be difficult. Reforestation can be accomplished by planting redwood and Douglas-fir seedlings. Natural reforestation by redwood sprouts and Douglas-fir seed trees provides variable stocking results. Both overstocked and understocked areas are common.

Among the common forest understory plants are salal, California huckleberry, and swordfern.

The main limitations affecting homesite development are the poor filtering capacity of the substratum and sloughing of cutbanks. The poor filtering capacity can result in failure of septic tank absorption fields. Alternative systems may be needed, such as systems that increase separation distances from ground water. If the density of housing is moderate or high, community sewage systems are needed to prevent the contamination of water supplies resulting from seepage. The design of access roads should control surface runoff and help to stabilize cut slopes.

The capability classification is IIIe-4(4), nonirrigated.

181—Mackerricher sandy loam, 9 to 30 percent slopes

This very deep, somewhat excessively drained soil is on stabilized sand dunes. It formed in eolian sand. The vegetation is mainly redwood and grand fir. Elevation ranges from 175 to 700 feet. The average annual precipitation is 40 to 55 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 290 to 365 days.

Typically, the surface layer is dark brown and brown sandy loam about 12 inches thick. The subsoil is brown and strong brown loamy sand about 18 inches thick. The substratum to a depth of 62 inches or more is yellowish brown sand.

Included with this soil in mapping are small areas of Branscomb, Sirdrak, and Usal soils and Tropaquepts. Also included are small areas that have slopes of 5 to 9 percent or 30 to 50 percent. Included areas make up about 20 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is moderately rapid in the Mackerricher soil. Available water capacity is low. The effective rooting depth is 60 inches or more. Surface runoff is medium or rapid, and the hazard of water erosion is moderate if the surface is left bare.

This unit is used for timber production, for homesite development, or as watershed.

Redwood, Douglas-fir, and grand fir are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index is 145 for redwood and 159 for Douglas-fir. The potential annual production from a fully stocked stand of redwood is 1,195 board feet per acre. Areas that are subject to strong, persistent winds, which limit tree height, are less productive than other areas of this unit. Trees of limited extent include bishop pine and tanoak.

The main limitation affecting the harvesting of timber is seasonal wetness. Using wheeled and tracked equipment when the soil is wet produces ruts, compacts the surface, and can damage the roots of trees. Disturbance of the protective layer of duff can be minimized by the careful use of wheeled and tracked equipment. Establishing plant cover on cut and fill slopes reduces the hazard of erosion. Rock for construction of roads generally is not available in areas of this unit.

Plant competition is a concern affecting the production of timber. When openings are made in the canopy, invading brushy plants that are not controlled can delay the establishment of seedlings. Because of the low available water capacity, the establishment of seedlings may be difficult. Reforestation can be accomplished by planting redwood and Douglas-fir seedlings. Natural reforestation by redwood sprouts and Douglas-fir seed trees provides variable stocking results. Both overstocked and understocked areas are common.

Among the common forest understory plants are salal, California huckleberry, and swordfern.

The main limitations affecting homesite development are the slope, the sloughing of cutbanks, and the poor filtering capacity of the substratum. The most favorable building sites are in the less sloping areas. Excavations for roads and buildings increase the hazard of erosion. Revegetating disturbed areas around construction sites as soon as possible helps to control erosion. The design of access roads should control surface runoff and help to stabilize cut slopes. The poor filtering capacity can result in failure of septic tank absorption fields. The slope is also a concern affecting the installation of septic tank absorption fields. Alternative systems may be needed. If the density of housing is moderate or high, community sewage systems are needed to prevent the contamination of water supplies resulting from seepage.

The capability classification is IVe-4(4), nonirrigated.

182—Mallopass loam, 0 to 5 percent slopes

This very deep, moderately well drained soil is on marine terraces. It formed in alluvium derived from mixed rock sources. The vegetation is mainly perennial grasses and forbs. Elevation ranges from 50 to 800 feet. The average annual precipitation is 35 to 45 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 250 to 330 days.

Typically, the surface layer is very dark grayish brown loam about 14 inches thick. The upper 20 inches of the subsoil is very dark gray and very dark grayish brown clay loam. The next 17 inches is light brownish gray gravelly sandy clay loam. The lower 11 inches is light brownish gray gravelly sandy clay loam that has strong brown mottles. In some areas the surface layer is gravelly clay loam or gravelly loam.

Included with this soil in mapping are small areas of Biaggi, Crispin, Flumeville, and Windyhollow soils and Tropaquepts. Also included are small areas that

have slopes of 5 to 9 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is moderately slow in the Mallopass soil. Available water capacity is high. The effective rooting depth is limited by saturation for brief periods following episodes of heavy rain from December through April. The saturated zone starts between the depths of 48 and 60 inches and extends to a depth of more than 60 inches. Surface runoff is very slow or slow, and the hazard of water erosion is slight if the surface is left bare.

This unit is used for livestock grazing, hay production, pasture, or wildlife habitat.

In areas used for livestock grazing, the characteristic plant community is mainly California oatgrass, hairy oatgrass, and common velvetgrass. Soil properties generally do not limit range management practices.

Few limitations affect the use of this unit for hay production and pasture.

Windbreaks may be desirable on this unit to protect buildings, livestock, and fields from prevailing winds. Few limitations affect the establishment of windbreaks. Supplemental irrigation may be needed when windbreaks are established and during dry periods. Among the trees that are suitable for planting are eucalyptus, Monterey cypress, Monterey pine, and bishop pine.

The capability classification is IIIe-2(4), nonirrigated, and IIe-2(4), irrigated.

183—Mallopass loam, 5 to 15 percent slopes

This very deep, moderately well drained soil is on marine terraces and coastal fan terraces. It formed in alluvium derived from mixed rock sources. The vegetation is mainly perennial grasses and forbs. Elevation ranges from 50 to 800 feet. The average annual precipitation is 35 to 45 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 250 to 330 days.

Typically, the surface layer is very dark grayish brown loam about 14 inches thick. The upper 20 inches of the subsoil is very dark gray clay loam. The next 17 inches is light brownish gray gravelly sandy clay loam. The lower 11 inches is light brownish gray gravelly sandy clay loam that has strong brown mottles. In some areas the surface layer is gravelly clay loam or gravelly loam.

Included with this soil in mapping are small areas of Biaggi, Flumeville, and Windyhollow soils and Tropaquepts. Also included are small areas that have slopes of 2 to 5 percent or 15 to 30 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is moderately slow in the Mallopass soil. Available water capacity is high. The effective rooting depth is limited by saturation for brief periods following episodes of heavy rain from December through April. The saturated zone starts between the depths of 48 and 60 inches and extends to a depth of more than 60 inches. Surface runoff is medium, and the hazard of water erosion is moderate if the surface is left bare.

This unit is used for livestock grazing, hay production, pasture, or wildlife habitat.

In areas used for livestock grazing, the characteristic plant community is mainly California oatgrass, hairy oatgrass, and common velvetgrass. Soil properties generally do not limit range management practices.

If this unit is used for hay production or pasture, the main limitation is the hazard of erosion. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and protect the soil from erosion. Seedbed preparation should be on the contour or across the slope where practical.

Windbreaks may be desirable on this unit to protect buildings, livestock, and fields from prevailing winds. Few limitations affect the establishment of windbreaks. Supplemental irrigation may be needed when windbreaks are established and during dry periods. Among the trees that are suitable for planting are eucalyptus, Monterey cypress, Monterey pine, and bishop pine.

The capability classification is IIIe-1(4), irrigated and nonirrigated.

184—Mallopass loam, 15 to 30 percent slopes

This very deep, moderately well drained soil is on coastal fan terraces. It formed in alluvium derived from mixed rock sources. The vegetation is mainly perennial grasses and forbs. Elevation ranges from 50 to 800 feet. The average annual precipitation is 35 to 45 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 250 to 330 days.

Typically, the surface layer is very dark grayish brown loam about 14 inches thick. The upper 20 inches of the subsoil is very dark gray clay loam. The next 17 inches is light brownish gray gravelly sandy clay loam. The lower 11 inches is light brownish gray

gravelly sandy clay loam that has strong brown mottles. In some areas the surface layer is gravelly clay loam or gravelly loam.

Included with this soil in mapping are small areas of Bruhel and Windyhollow soils. Also included are small areas that have slopes of 9 to 15 percent or 30 to 50 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is moderately slow in the Mallopass soil. Available water capacity is high. The effective rooting depth is limited by saturation for brief periods following episodes of heavy rain from December through April. The saturated zone starts between the depths of 48 and 60 inches and extends to a depth of more than 60 inches. Surface runoff is rapid, and the hazard of water erosion is moderate if the surface is left bare.

This unit is used for livestock grazing, hay production, pasture, or wildlife habitat.

In areas used for livestock grazing, the characteristic plant community is mainly California oatgrass, hairy oatgrass, and common velvetgrass. Soil properties generally do not limit range management practices.

If this unit is used for hay production or pasture, the main limitations are the slope and the hazard of erosion. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and protect the soil from erosion. Seedbed preparation should be on the contour or across the slope where practical.

Windbreaks may be desirable on this unit to protect buildings, livestock, and fields from prevailing winds. Few limitations affect the establishment of windbreaks. Supplemental irrigation may be needed when windbreaks are established and during dry periods. Among the trees that are suitable for planting are eucalyptus, Monterey cypress, Monterey pine, and bishop pine.

The capability classification is IVe-1(4), irrigated and nonirrigated.

185—Maymen-Etsel-Snook complex, 30 to 75 percent slopes

This map unit is on mountains. The vegetation is mainly brush. Elevation ranges from 1,200 to 3,800 feet. The average annual precipitation is 50 to 70 inches, the average annual air temperature is about 55 degrees F, and the average frost-free period is 150 to 250 days.

This unit is about 35 percent Maymen loam, 25 percent Etsel gravelly sandy loam, and 25 percent Snook loam. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Gube, Garcia, Hopland, Woodin, and Wohly soils and areas of Rock outcrop. Also included are small areas that have slopes of 15 to 30 percent or 75 to 99 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

The Maymen soil is shallow to bedrock and is somewhat excessively drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is brown loam about 8 inches thick. The subsoil is light brown loam about 6 inches thick. Hard, fractured sandstone is at a depth of about 14 inches.

Permeability is moderate in the Maymen soil. Available water capacity is very low. The effective rooting depth is limited by bedrock at a depth of 10 to 20 inches. Surface runoff is rapid or very rapid, and the hazard of water erosion is severe or very severe if the surface is left bare.

The Etsel soil is very shallow or shallow to bedrock and is somewhat excessively drained. It formed in material derived from sandstone or shale. Typically, the surface layer is brown gravelly sandy loam about 5 inches thick. The underlying material is pale brown very gravelly sandy loam about 9 inches thick. Hard, fractured shale or sandstone bedrock is at a depth of about 14 inches.

Permeability is moderate in the Etsel soil. Available water capacity is very low. The effective rooting depth is limited by bedrock at a depth of 8 to 14 inches. Surface runoff is rapid or very rapid, and the hazard of water erosion is severe or very severe if the surface is left bare.

The Snook soil is very shallow to bedrock and is somewhat excessively drained. It formed in material derived from sandstone or shale. Typically, the surface layer is pale brown loam about 6 inches thick over hard fractured sandstone. In some areas the surface layer is gravelly loam.

Permeability is moderate in the Snook soil. Available water capacity is very low. The effective rooting depth is limited by bedrock at a depth of 4 to 10 inches. Surface runoff is rapid or very rapid, and the hazard of water erosion is severe or very severe if the surface is left bare.

This unit is used as watershed, as wildlife habitat, or for recreation.

The naturally occurring vegetation is mainly brush

because of the limited soil depth and the restricted available water capacity. Properly planned and applied prescribed burning, chemical treatment, or mechanical treatment can be used in small areas to improve wildlife habitat, increase access, increase the runoff rate, and reduce the fire hazard. Firebreaks constructed on ridgetops help to prevent wildfires, but they increase the hazard of water erosion. In areas that have been cleared for firebreaks, establishing water bars and seeding grass help to control water erosion.

The capability classification is VIIe(5), nonirrigated.

186—Maymen-Woodin-Etsel complex, 30 to 75 percent slopes

This map unit is on mountains. The vegetation is mainly brush and hardwoods. Elevation ranges from 1,600 to 4,235 feet. The average annual precipitation is 55 to 70 inches, the average annual air temperature is about 55 degrees F, and the average frost-free period is 150 to 250 days.

This unit is about 35 percent Maymen loam, 30 percent Woodin extremely gravelly sandy loam, and 15 percent Etsel gravelly sandy loam. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Garcia, Snook, Gube, and Wohly soils and areas of Rock outcrop. Also included are small areas that have slopes of 15 to 30 percent or 75 to 99 percent. Included areas make up about 20 percent of the total acreage of the unit. The percentage varies from one area to another.

The Maymen soil is shallow to bedrock and is somewhat excessively drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is brown loam about 8 inches thick. The subsoil is light brown loam about 6 inches thick. Hard, fractured sandstone is at a depth of about 14 inches. In some areas the surface layer is gravelly loam.

Permeability is moderate in the Maymen soil. Available water capacity is very low. The effective rooting depth is limited by bedrock at a depth of 10 to 20 inches. Surface runoff is rapid or very rapid, and the hazard of water erosion is severe or very severe if the surface is left bare.

The Woodin soil is moderately deep to bedrock and is well drained. It formed in material derived from sandstone. The surface layer is very dark brown extremely gravelly sandy loam about 6 inches thick. The subsoil is very pale brown extremely gravelly loam about 16 inches thick. Hard, fractured sandstone is at a depth of about 22 inches. In some areas the surface layer is very gravelly loam, very gravelly sandy loam, or extremely gravelly loam.

Permeability is moderate in the Woodin soil. Available water capacity is very low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is rapid or very rapid, and the hazard of water erosion is severe or very severe if the surface is left bare.

The Etsel soil is very shallow or shallow to bedrock and is somewhat excessively drained. It formed in material derived from sandstone or shale. Typically, the surface layer is brown gravelly sandy loam about 5 inches thick. The underlying material is pale brown very gravelly sandy loam about 9 inches thick. Hard, fractured shale is at a depth of about 14 inches.

Permeability is moderate in the Etsel soil. Available water capacity is very low. The effective rooting depth is limited by bedrock at a depth of 8 to 14 inches. Surface runoff is rapid or very rapid, and the hazard of water erosion is severe or very severe if the surface is left bare.

This unit is used mainly as watershed or wildlife habitat or for recreation.

The natural vegetation on this unit is mainly brush because of the limited soil depth and the restricted available water capacity. Properly planned and applied prescribed burning, chemical treatment, or mechanical treatment can be used in small areas to improve wildlife habitat, increase access, increase the runoff rate, and reduce the fire hazard.

The capability classification is VIIe(5), nonirrigated.

187—Ornbaun-Zeni complex, 9 to 30 percent slopes

This map unit is on ridges and toe slopes of hills and mountains. The vegetation is mainly Douglas-fir and redwood. Elevation ranges from 200 to 2,000 feet. The average annual precipitation is 40 to 70 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 220 to 320 days.

This unit is about 45 percent Ornbaun loam and 40 percent Zeni loam. The Ornbaun and Zeni soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Yellowhound and Threechop soils and small

areas of soils that have been altered by skid trails, landings, and roads. Also included are small areas that have slopes of 5 to 9 percent or 30 to 50 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

The Ornbaun soil is deep to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1/2 inch thick. The surface layer is light yellowish brown loam about 3 inches thick. The upper 37 inches of the subsoil is light brown and reddish yellow loam. The lower 19 inches is reddish yellow and pink clay loam. Soft, fractured sandstone is at a depth of about 59 inches.

Permeability is moderate in the Ornbaun soil. Available water capacity is high. The effective rooting depth is limited by weathered bedrock at a depth of 40 to 60 inches. Surface runoff is medium or rapid, and the hazard of water erosion is moderate if the surface is left bare.

The Zeni soil is moderately deep to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is pale brown loam about 4 inches thick. The subsoil is yellow and light brown loam about 26 inches thick. Soft, fractured sandstone is at a depth of about 30 inches.

Permeability is moderate in the Zeni soil. Available water capacity is low or moderate. The effective rooting depth is limited by weathered bedrock at a depth of 20 to 40 inches. Surface runoff is medium or rapid, and the hazard of water erosion is moderate if the surface is left bare.

This unit is used for timber production or as watershed.

Douglas-fir, redwood, tanoak, and Pacific madrone are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 155 on the Ornbaun soil and 129 on the Zeni soil. The potential annual production from a fully stocked stand of Douglas-fir is 770 board feet per acre on the Ornbaun soil and 525 board feet per acre on the Zeni soil. On the basis of a 100-year site curve, the mean site index for redwood is 152 on the Ornbaun soil and 130 on the Zeni soil.

The main limitation affecting the harvesting of timber is seasonal wetness. Using wheeled and tracked equipment when the soils are wet produces ruts, compacts the surface, and can damage the roots of trees. Disturbance of the protective layer of duff can be minimized by the careful use of wheeled and tracked equipment. Roads on this unit are dusty when dry. Surface treatment may be desirable during periods of heavy use. Unsurfaced roads and skid trails are slippery when wet. They may be impassable during rainy periods. Suitable surfacing of roads is needed for use during wet seasons. Rock for construction of roads generally is not available in areas of this unit.

Plant competition is a concern affecting the production of timber. When openings are made in the canopy, invading brushy plants that are not controlled can prevent the establishment of seedlings. Reforestation can be accomplished by planting Douglas-fir and redwood seedlings. If seed trees are present, natural reforestation of cutover areas by Douglas-fir occurs infrequently. After it is cut, redwood can regenerate by sprouting. These sprouts seldom provide optimum stocking.

Among the common forest understory plants are California huckleberry, iris, and brackenfern.

The capability classification is IVe-1(4), nonirrigated.

188—Ornbaun-Zeni complex, 30 to 50 percent slopes

This map unit is on hills and mountains. The vegetation is mainly Douglas-fir and redwood. Elevation ranges from 200 to 2,000 feet. The average annual precipitation is 40 to 70 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 220 to 320 days.

This unit is about 45 percent Ornbaun loam and 40 percent Zeni loam. The Ornbaun and Zeni soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Yellowhound and Kibesillah soils and small areas of soils that have been altered by skid trails, landings, and roads. Also included are small areas that have slopes of 15 to 30 percent or 50 to 75 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

The Ornbaun soil is deep to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1/2 inch thick. The surface layer is light yellowish brown loam about 3 inches thick. The upper 37 inches of the subsoil is light brown, yellowish red, and reddish yellow loam. The lower 19 inches is reddish yellow and pink clay loam. Soft, fractured sandstone is at a depth of about 59 inches.

Permeability is moderate in the Ornbaun soil. Available water capacity is high. The effective rooting depth is limited by weathered bedrock at a depth of 40 to 60 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

The Zeni soil is moderately deep to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is pale brown loam about 4 inches thick. The subsoil is yellow and light brown loam about 26 inches thick. Soft, fractured sandstone is at a depth of about 30 inches.

Permeability is moderate in the Zeni soil. Available water capacity is low or moderate. The effective rooting depth is limited by weathered bedrock at a depth of 20 to 40 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

This unit is used for timber production or as watershed.

Douglas-fir, redwood, tanoak, and Pacific madrone are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 155 on the Ornbaun soil and 129 on the Zeni soil. The potential annual production from a fully stocked stand of Douglas-fir is 770 board feet per acre on the Ornbaun soil and 525 board feet per acre on the Zeni soil. On the basis of a 100-year site curve, the mean site index for redwood is 152 on the Ornbaun soil and 130 on the Zeni soil.

The main limitations affecting the harvesting of timber are the slope, the hazard of erosion, and seasonal wetness. Wheeled and tracked equipment can be used in the more gently sloping areas, but cable yarding systems generally cause less disturbance of the soil in the steeper areas. Disturbance of the protective layer of duff can be minimized by the careful use of either wheeled and tracked equipment or cable yarding systems. Unless adequate plant cover or water bars are provided, steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying. Establishing plant cover on steep cut and fill slopes reduces the hazard of surface erosion. Using wheeled and tracked equipment when the soils are wet produces ruts, compacts the surface, and can damage the roots of trees. Roads on this unit are dusty when dry. Surface treatment may be desirable during periods of heavy use. Unsurfaced roads and skid trails are slippery when wet. They may impassable during rainy periods. Suitable surfacing of roads is needed for use during wet seasons. Rock for construction of roads generally is not available in areas of this unit.

Plant competition is a concern affecting the production of timber. When openings are made in the canopy, invading brushy plants that are not controlled can prevent the establishment of seedlings. Reforestation can be accomplished by planting Douglas-fir and redwood seedlings. If seed trees are present, natural reforestation of cutover areas by Douglas-fir occurs infrequently. After it is cut, redwood can regenerate by sprouting. These sprouts seldom provide optimum stocking.

Among the common forest understory plants are California huckleberry, iris, and brackenfern.

The capability classification is VIe(4), nonirrigated.

189—Ornbaun-Zeni complex, 50 to 75 percent slopes

This map unit is on hills and mountains. The vegetation is mainly Douglas-fir and redwood. Elevation ranges from 200 to 2,000 feet. The average annual precipitation is 40 to 70 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 220 to 320 days.

This unit is about 40 percent Ornbaun loam and 40 percent Zeni loam. The Ornbaun and Zeni soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Yellowhound and Kibesillah soils and small areas of soils that have been altered by skid trails, landings, and roads. Also included are small areas that have slopes of 30 to 50 percent or 75 to 99 percent. Included areas make up about 20 percent of the total acreage of the unit. The percentage varies from one area to another.

The Ornbaun soil is deep to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1/2 inch thick. The surface layer is light yellowish brown loam about 3 inches thick. The upper 37 inches of the subsoil is light brown and reddish yellow loam. The lower 19 inches is reddish yellow and pink clay loam. Soft, fractured sandstone is at a depth of about 59 inches.

Permeability is moderate in the Ornbaun soil. Available water capacity is high. The effective rooting depth is limited by weathered bedrock at a depth of 40 to 60 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

The Zeni soil is moderately deep to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is pale brown loam about 4 inches thick. The subsoil is yellow and light brown loam about 26 inches thick. Soft, fractured sandstone is at a depth of about 30 inches.

Permeability is moderate in the Zeni soil. Available water capacity is low or moderate. The effective rooting depth is limited by weathered bedrock at a depth of 20 to 40 inches. Surface runoff is very rapid, and the hazard of water erosion is severe if the surface is left bare.

This unit is used for timber production or as watershed.

Douglas-fir, redwood, tanoak, and Pacific madrone are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 155 on the Ornbaun soil and 129 on the Zeni soil. The potential annual production from a fully stocked stand of Douglas-fir is 770 board feet per acre on the Ornbaun soil and 525 board feet per acre on the Zeni soil. On the basis of a 100-year site curve, the mean site index for redwood is 152 on the Ornbaun soil and 130 on the Zeni soil.

The main limitations affecting the harvesting of timber are the slope, the hazard of erosion, and seasonal wetness. When timber is harvested, the slope limits the use of wheeled and tracked equipment in skidding operations. Cable yarding systems generally cause less disturbance of the soil. Unless adequate plant cover or water bars are provided, steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying. Harvesting systems that lift logs entirely off the ground minimize the disturbance of the protective layer of duff. Establishing plant cover on steep cut and fill slopes reduces the hazard of surface erosion. Roads may fail and landslides may occur following deep soil disturbance in the steeper areas. Roads are dusty when dry. Surface treatment may be desirable during periods of heavy use. Unsurfaced roads and skid trails are slippery when wet. They may be impassable during rainy periods. Suitable surfacing of roads is needed for use during wet seasons. Rock for construction of roads generally is not available in areas of this unit.

Plant competition is a concern affecting the production of timber. When openings are made in the canopy, invading brushy plants that are not controlled can prevent the establishment of seedlings. Reforestation can be accomplished by planting Douglas-fir and redwood seedlings. If seed trees are present, natural reforestation of cutover areas by Douglas-fir occurs infrequently. After it is cut, redwood can regenerate by sprouting. These sprouts seldom provide adequate stocking.

Among the common forest understory plants are California huckleberry, iris, and brackenfern.

The capability classification is VIIe(4), nonirrigated.

190—Pardaloe-Woodin complex, 50 to 75 percent slopes

This map unit is on hills and mountains. The vegetation is mainly Douglas-fir and tanoak. Elevation ranges from 800 to 3,500 feet. The average annual precipitation is 45 to 70 inches, the average annual air temperature is about 55 degrees F, and the average frost-free period is 150 to 250 days.

This unit is about 45 percent Pardaloe very gravelly loam and 30 percent Woodin extremely gravelly sandy loam. The Pardaloe and Woodin soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Maymen, Casabonne, and Wohly soils and small areas of soils that have been altered by skid trails, landings, and roads. Also included are small areas that have slopes of 30 to 50 percent or 75 to 99 percent. Included areas make up about 25 percent of the total acreage of the unit. The percentage varies from one area to another.

The Pardaloe soil is deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface layer is pink very gravelly loam about 11 inches thick. The upper 15 inches of the subsoil is very pale brown extremely gravelly sandy loam. The lower 28 inches is brownish yellow and reddish yellow extremely gravelly sandy clay loam. Hard, fractured sandstone is at a depth of about 54 inches. In some areas the surface layer is gravelly sandy loam, gravelly loam, or very gravelly sandy loam.

Permeability is moderate in the Pardaloe soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 40 to 60 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

The Woodin soil is moderately deep to bedrock and is well drained. It formed in material derived from sandstone. The surface layer is very dark brown extremely gravelly sandy loam about 6 inches thick.

The subsoil is very pale brown extremely gravelly loam about 16 inches thick. Hard, fractured sandstone is at a depth of about 22 inches. In some areas the surface layer is very gravelly loam, very gravelly sandy loam, or extremely gravelly loam.

Permeability is moderate in the Woodin soil. Available water capacity is very low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

This unit is used for timber production or as watershed.

Tanoak, canyon live oak, and Douglas-fir are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 122 on the Pardaloe soil and 97 on the Woodin soil. The potential annual production from a fully stocked stand of Douglas-fir is 455 board feet per acre on the Pardaloe soil and 245 board feet per acre on the Woodin soil. This potential production is rarely achieved, however, because of the inherent tendency of these soils to produce understocked stands.

The main limitations affecting the harvesting of timber are the slope and the hazard of erosion. When timber is harvested, the slope limits the use of wheeled and tracked equipment in skidding operations. Cable yarding systems generally cause less disturbance of the soil. Revegetation of exposed subsoil is difficult on this unit; however, it generally is not needed for control of surface erosion because of the large amount of coarse fragments. Roads may fail and landslides may occur following deep soil disturbance in the steeper areas. Rock for construction of roads is generally available in areas of this unit. Rocks and loose soil material may slide onto roads. This hazard increases the need for road maintenance.

Seedling establishment is a concern affecting the production of timber. Reforestation can be accomplished by planting Douglas-fir and ponderosa pine seedlings on the Pardaloe soil. The high soil temperature and low content of soil moisture during the growing season result in a high seedling mortality rate, especially on south- and southwest-facing slopes. Movement of loose surface material can reduce the seedling survival rate in the steeper areas. Plantings on the Woodin soil frequently fail because of the very low available water capacity.

Among the common forest understory plants are canyon live oak, hairy manzanita, and iris.

The capability classification is VIIs(5), nonirrigated.

191—Pardaloe-Woodin-Casabonne complex, 30 to 50 percent slopes

This map unit is on hills and mountains. The vegetation is mainly Douglas-fir and tanoak. Elevation ranges from 800 to 3,500 feet. The average annual precipitation is 45 to 70 inches, the average annual air temperature is about 55 degrees F, and the average frost-free period is 150 to 250 days.

This unit is about 45 percent Pardaloe very gravelly loam, 25 percent Woodin extremely gravelly sandy loam, and 15 percent Casabonne gravelly loam. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Maymen, Garcia, and Wohly soils and small areas of soils that have been altered by skid trails, landings, and roads. Also included are small areas that have slopes of 15 to 30 percent or 50 to 75 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

The Pardaloe soil is deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface layer is pink very gravelly loam about 11 inches thick. The upper 15 inches of the subsoil is very pale brown extremely gravelly sandy loam. The lower 28 inches is brownish yellow and reddish yellow extremely gravelly sandy clay loam. Hard, fractured sandstone is at a depth of about 54 inches. In some areas the surface layer is gravelly sandy loam, gravelly loam, or very gravelly sandy loam.

Permeability is moderate in the Pardaloe soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 40 to 60 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

The Woodin soil is moderately deep to bedrock and is well drained. It formed in material derived from sandstone. The surface layer is very dark brown extremely gravelly sandy loam about 6 inches thick. The subsoil is very pale brown extremely gravelly loam about 16 inches thick. Hard, fractured sandstone is at a depth of about 22 inches. In some areas the surface layer is very gravelly loam, very gravelly sandy loam, or extremely gravelly loam.

Permeability is moderate in the Woodin soil. Available water capacity is very low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

The Casabonne soil is deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1/2 inch thick. The surface layer is brown gravelly loam about 11 inches thick. The upper 25 inches of the subsoil is brown clay loam. The lower 13 inches is reddish yellow gravelly clay loam. Hard, fractured sandstone is at a depth of about 49 inches. In some areas the surface layer is loam.

Permeability is moderate in the Casabonne soil. Available water capacity is moderate or high. The effective rooting depth is limited by bedrock at a depth of 40 to 60 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

This unit is used for timber production or as watershed.

Tanoak, canyon live oak, and Douglas-fir are the main tree species on the Pardaloe and Woodin soils. Douglas-fir, tanoak, and Pacific madrone are the main tree species on the Casabonne soil. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 122 on the Pardaloe soil, 97 on the Woodin soil, and 144 on the Casabonne soil. The potential annual production from a fully stocked stand of Douglas-fir is 455 board feet per acre on the Pardaloe soil, 245 board feet per acre on the Woodin soil, and 665 board feet per acre on the Casabonne soil. The potential annual production on the Woodin and Pardaloe soils is rarely achieved, however, because of the inherent tendency of these soils to produce understocked stands.

The main limitation affecting the harvesting of timber is the slope. Wheeled and tracked equipment can be used in the more gently sloping areas, but cable yarding systems generally cause less disturbance of the soil in the steeper areas. Revegetation of exposed subsoil on the Pardaloe and Woodin soils is difficult; however, it generally is not needed for control of surface erosion because of the large amount of coarse fragments. Establishing plant cover on steep cut and fill slopes reduces the hazard of surface erosion on the Casabonne soil. Rock for construction of roads is generally available in areas of this unit. Rocks and loose soil material may slide onto roads. This hazard increases the need for road maintenance.

Seedling establishment is a concern affecting the production of timber. Reforestation can be accomplished by planting Douglas-fir and ponderosa pine seedlings on the Pardaloe and Casabonne soils. The high soil temperature and low content of soil moisture during the growing season result in a high seedling mortality rate, especially on south- and southwest-facing slopes in areas of the Pardaloe soil. Plantings on the Woodin soil frequently fail because of the very low available water capacity.

Among the common forest understory plants are hairy manzanita, canyon live oak, and iris.

The capability classification is VIe(5), nonirrigated.

192—Perrygulch loam, 0 to 9 percent slopes

This very deep, very poorly drained soil is on river terraces. It formed in alluvium derived from mixed rock sources. The vegetation is mainly annual grasses and forbs. Elevation ranges from 200 to 400 feet. The average annual precipitation is 40 to 50 inches, the average annual air temperature is about 56 degrees F, and the average frost-free period is 175 to 250 days.

Typically, the surface layer is light brownish gray and light gray loam about 7 inches thick. The upper 9 inches of the subsoil is light gray sandy clay loam that has reddish yellow mottles. The next 28 inches is light gray clay and sandy clay that have very pale brown and strong brown mottles. Below this is 8 inches of light gray and pale yellow sandy clay loam that has strong brown mottles. The lower part of the subsoil to a depth of 61 inches or more is pale yellow and light yellowish brown gravelly sandy clay loam. In some areas the surface layer is sandy loam or silt loam.

Included with this soil in mapping are small areas of Boontling and Pinole soils. Also included are small areas that have slopes of 9 to 15 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is slow in the Perrygulch soil. Available water capacity is high. The effective rooting depth is limited by saturation for long periods following episodes of heavy rain from December through April. The saturated zone starts between the surface and a depth of 12 inches and extends to a depth of 60 inches or more. Surface runoff is slow or medium, and the hazard of water erosion is slight or moderate if the surface is left bare.

This unit is used for livestock grazing or wildlife habitat.

The characteristic plant community is mainly slender oat, wild oat, and soft chess. The main limitation affecting range management is the seasonal wetness. The long periods of saturation limit the use of equipment to dry periods. Grazing should be delayed until the soil has drained sufficiently to

withstand trampling by livestock. If seeding is considered, species that are tolerant of seasonally saturated soil conditions should be selected.

The capability classification is IIIw-2(14), nonirrigated.

193—Pinole loam, 2 to 9 percent slopes

This very deep, well drained soil is on river terraces. It formed in alluvium derived from mixed rock sources. The vegetation in areas that are not cultivated is mainly annual grasses and forbs. Elevation ranges from 200 to 400 feet. The average annual precipitation is 40 to 50 inches, the average annual air temperature is about 56 degrees F, and the average frost-free period is 175 to 250 days.

Typically, the surface layer is brown loam about 10 inches thick. The subsoil to a depth of 62 inches or more is yellowish brown, strong brown, and brownish yellow clay loam.

Included with this soil in mapping are small areas of Boontling and Gschwend soils. Also included are small areas that have slopes of 9 to 15 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is moderately slow in the Pinole soil. Available water capacity is high or very high. The effective rooting depth is 60 inches or more. Surface runoff is slow or medium, and the hazard of water erosion is slight or moderate if the surface is left bare.

This unit is used for production of wine grapes and apples.

Few limitations affect the production of wine grapes and apples on this soil. Managing cover crops by mowing instead of tillage helps to control erosion and reduces energy consumption. Irrigation may be needed to establish grapes. Sprinkler and trickle irrigation methods are suitable for vineyards. These methods permit the even, controlled application of water, minimize runoff, and reduce the hazard of erosion. Wine grape production is estimated at 4 to 5 tons per acre. Apple production is estimated at 15 to 20 tons per acre.

The capability classification is IIIe-1(14), nonirrigated, and IIe-1(14), irrigated.

194—Pinole loam, 9 to 15 percent slopes

This very deep, well drained soil is on river terraces. It formed in alluvium derived from mixed rock sources. The vegetation in areas that are not cultivated is mainly annual grasses and forbs. Elevation ranges from 200 to 400 feet. The average annual precipitation is 40 to 50 inches, the average annual air temperature is about 56 degrees F, and the average frost-free period is 175 to 250 days.

Typically, the surface layer is brown loam about 10 inches thick. The subsoil to a depth of 62 inches or more is yellowish brown and strong brown clay loam.

Included with this soil in mapping are small areas of Boontling soils. Also included are small areas that have slopes of 5 to 9 percent or 15 to 30 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is moderately slow in the Pinole soil. Available water capacity is high or very high. The effective rooting depth is 60 inches or more. Surface runoff is medium, and the hazard of water erosion is moderate if the surface is left bare.

This unit is used for production of wine grapes and apples.

The main limitations affecting the production of wine grapes and apples are the slope and the hazard of erosion. Contour farming and cover crops help to control erosion. Managing cover crops by mowing instead of tillage helps to control erosion and reduces energy consumption. Irrigation may be needed if grapes are to be established. Sprinkler and trickle irrigation methods are suitable for vineyards. These methods permit the even, controlled application of water, minimize runoff, and reduce the hazard of erosion. Wine grape production is estimated at 4 to 5 tons per acre. Apple production is estimated at 15 to 20 tons per acre.

The capability classification is IIIe-1(14), irrigated and nonirrigated.

195—Pits and Dumps

This map unit occurs in any position on the landscape. It supports little vegetation. Elevation ranges from 300 to 1,000 feet. The average annual precipitation is 40 to 70 inches, the average annual air temperature is 53 to 56 degrees F, and the average frost-free period is 175 to 300 days.

Pits and Dumps are areas from which soil and underlying material have been removed. They include sand and gravel borrow pits, refuse disposal sites, and road debris dumps.

Drainage, permeability, surface runoff, depth of the root zone, and available water capacity are variable. The hazard of water erosion is also variable.

Revegetation of these areas is difficult because of the low fertility of the exposed materials.

The capability classification is VIII(4), nonirrigated.

196—Quinliven-Ferncreek complex, 2 to 15 percent slopes

This map unit is on marine terraces. The vegetation is mainly redwood, Douglas-fir, and bishop pine. Elevation ranges from 100 to 1,000 feet. The average annual precipitation is 40 to 65 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 290 to 365 days.

This unit is about 60 percent Quinliven sandy loam and 25 percent Ferncreek sandy loam. The Quinliven and Ferncreek soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Caspar and Harecreek soils. Also included are small areas that have slopes of 15 to 30 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

The Quinliven soil is very deep and is moderately well drained. It formed in marine sediments. Typically, the surface is covered with a mat of litter about 5 inches thick. The surface layer is light gray sandy loam about 4 inches thick. The next layer is white and very pale brown loam about 7 inches thick. The upper 7 inches of the subsoil is light yellowish brown loam. The next 14 inches is brownish yellow clay. Below this is 19 inches of brownish yellow clay that has red mottles. The lower 9 inches of the subsoil is yellowish red clay loam that has strong brown and light gray mottles. The substratum to a depth of 64 inches or more is yellowish red sandy loam that has strong brown mottles. In some areas the surface layer is loamy sand or loam.

Permeability is slow in the Quinliven soil. Available water capacity is high. The effective rooting depth is limited by saturation between the depths of 48 and 72 inches for brief periods following episodes of heavy rain from December through April. Surface runoff is slow or medium, and the hazard of water erosion is slight or moderate if the surface is left bare.

The Ferncreek soil is very deep and is somewhat poorly drained. It formed in marine sediments. Typically, the surface is covered with a mat of litter about 2 inches thick. The surface layer is gray and white sandy loam about 7 inches thick. The upper 17 inches of the subsoil is very pale brown and light yellowish brown clay loam and clay. The next 9 inches is brownish yellow clay that has reddish yellow and red mottles. The lower 10 inches of the subsoil is brownish yellow sandy clay loam that has red and white mottles. The substratum to a depth of 61 inches or more is yellow sandy loam that has red and white mottles.

Permeability is slow in the Ferncreek soil. Available water capacity is high. The effective rooting depth is limited by saturation for brief or long periods following episodes of heavy rain from December through April. The saturated zone starts between the depths of 24 and 48 inches and extends to a depth of more than 60 inches. Surface runoff is slow or medium, and the hazard of water erosion is slight or moderate if the surface is left bare.

This unit is used for timber production, for homesite development, or as watershed.

Redwood, Douglas-fir, bishop pine, and tanoak are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index for redwood is 124 on the Quinliven soil and 136 on the Ferncreek soil. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 135 on the Quinliven soil and 159 on the Ferncreek soil. The potential annual production from a fully stocked stand of redwood is 895 board feet per acre on the Quinliven soil and 1,060 board feet per acre on the Ferncreek soil. Areas that are subject to strong, persistent winds, which limit tree height, are less productive than other areas of this unit. Trees of limited extent include western hemlock, grand fir, and Mendocino cypress.

The main limitations affecting the harvesting of timber are the hazard of erosion and the seasonal wetness. The surface layer of these soils is subject to sheet and rill erosion when exposed. Disturbance of the protective layer of duff can be minimized by the careful use of wheeled and tracked equipment. Establishing plant cover on steep cut and fill slopes reduces the hazard of erosion. Another limitation is low bearing strength when the soils are saturated. Using wheeled and tracked equipment when the soils are moist produces ruts, compacts the surface, and can damage the roots of trees. Unsurfaced roads and skid trails are slippery and soft when wet. They may be impassable during rainy periods. Suitable surfacing of roads is needed for use during wet seasons. The design of roads should offset the limited ability of the soils to support a load. Roads are dusty when dry. Surface treatment may be

desirable during periods of heavy use. Rock for construction of roads generally is not available in areas of this unit.

Plant competition is a concern affecting the production of timber. When openings are made in the canopy, invading brushy plants that are not controlled can delay the establishment of seedlings. Because the surface layer of these soils has a low capacity to hold nutrients and water, the establishment of seedlings may be difficult. Reforestation can be accomplished by planting redwood and Douglas-fir seedlings. Natural reforestation by redwood sprouts and Douglas-fir seed trees provides variable stocking results. Both overstocked and understocked areas are common.

Among the common forest understory plants are tanoak, brackenfern, bedstraw, salal, California huckleberry, and swordfern.

The main limitations affecting homesite development are the slope, the low strength, the seasonally saturated soil conditions, and the restricted permeability. Excavations for roads and buildings increase the hazard of erosion. Revegetating disturbed areas around construction sites as soon as possible helps to control erosion. The design of access roads should control surface runoff and help to stabilize cut slopes. The design of buildings and roads should offset the limited ability of the soils to support a load. Surface drainage may be needed for roads and buildings. The seasonal wetness and the restricted permeability in the subsoil increase the possibility of failure of septic tank absorption fields. Alternative systems may be needed, such as those in which leach lines are placed in a mound above the soil surface.

The capability classification is IIIe-3(4), nonirrigated.

197—Riverwash

This unit is in active river channels. Slopes range from 0 to 2 percent. Vegetation, if it occurs, is mainly water-tolerant grasses and some willows. Elevation ranges from 50 to 1,500 feet.

Areas of this unit are inundated during periods of high water and are subject to deposition and removal of material. The unit consists of stratified layers of water-deposited sands, gravel, and cobbles. The thickness of these layers is extremely variable and is dependent upon water velocity and location within the channel.

This unit is used as a source of sand and gravel.

The capability classification is VIII(4), nonirrigated.

198—Seaside-Rock outcrop complex, 5 to 30 percent slopes

This map unit is on coastal hills and mountains. The vegetation is mainly manzanita and stunted cypress. Elevation ranges from 100 to 1,000 feet. The average annual precipitation is 45 to 55 inches, the average annual air temperature is about 55 degrees F, and the average frost-free period is 250 to 320 days.

This unit is about 40 percent Seaside loamy sand and 40 percent Rock outcrop. The Seaside soil and the Rock outcrop occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Havensneck soils. Also included are small areas that have slopes of 30 to 50 percent. Included areas make up about 20 percent of the total acreage of the unit. The percentage varies from one area to another.

The Seaside soil (fig. 5) is very shallow to bedrock and is somewhat excessively drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about $^{1}/_{2}$ inch thick. The surface layer is very pale brown loamy sand about 1 inch thick. The subsoil is pale brown sandy loam about 6 inches thick. Hard, fractured sandstone is at a depth of about 7 inches. In some areas the surface layer is bouldery sandy loam.

Permeability is rapid in the Seaside soil. Available water capacity is very low. The effective rooting depth is limited by bedrock at a depth of 5 to 10 inches. Surface runoff is medium or rapid, and the hazard of water erosion is moderate if the surface is left bare.

Rock outcrop consists of hard sandstone. It is in areas that support little or no vegetation.

This unit is used for homesite development, for wildlife habitat, or as watershed.

The main limitations affecting homesite development are the slope and the very shallow depth to bedrock. The most favorable building sites are in the less sloping areas. Excavations for roads and buildings increase the hazard of erosion. Revegetating disturbed areas around construction sites as soon as possible helps to control erosion.

Figure 5.—The very shallow Seaside soil supports stunted Mendocino cypress, bishop pine, and glossyleaf manzanita.

The design of access roads should control surface runoff and help to stabilize cut slopes. The very shallow depth to bedrock limits the use of this unit as a site for septic tank absorption fields. Alternative systems may be needed, such as those in which leach lines are placed in a mound above the soil surface.

The capability classification is VIIs(4), nonirrigated.

199—Shinglemill-Gibney complex, 2 to 9 percent slopes

This map unit is on marine terraces. The vegetation is mainly bishop pine and huckleberry. Elevation ranges from 200 to 750 feet. The average annual precipitation is 40 to 65 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 270 to 330 days.

This unit is about 45 percent Shinglemill loam and 35 percent Gibney loam. The Shinglemill and Gibney soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Blacklock, Gibwell, and Tregoning soils and Tropaquepts. These included soils make up about 20 percent of the total acreage of the unit. The percentage varies from one area to another.

The Shinglemill soil is very deep and is poorly drained. It formed in marine sediments. Typically, the surface is covered with a mat of litter about 2 inches thick. The surface layer is light gray, light brownish gray, and very pale brown loam about 3 inches thick. The next layer is very pale brown and reddish yellow loam about 5 inches thick. The upper 7 inches of the subsoil is very pale brown loam. The next 10 inches is light yellowish brown clay. The lower part of the subsoil to a depth of 63 inches or more is light yellowish brown, yellow, and brownish yellow clay and sandy clay that have light gray, white, and red mottles. In some areas the surface layer is sandy loam.

Permeability is slow in the Shinglemill soil. Available water capacity is high. The effective rooting depth is limited by saturation for long periods following episodes of heavy rain from December through April. The saturated zone starts between the depths of 12 and 30 inches and extends to a depth of more than 60 inches. Surface runoff is slow or medium, and the hazard of water erosion is slight or moderate if the surface is left bare.

The Gibney soil is very deep and is somewhat poorly drained. It formed in marine sediments. Typically, the surface is covered with a mat of litter about 3 inches thick. The surface layer is pale yellow loam about 9 inches thick. The upper 6 inches of the subsoil is brownish yellow sandy clay loam. The next layer is yellowish brown clay loam about 14 inches thick. Below this is 11 inches of yellowish brown clay that has strong brown and red mottles. The next layer is brownish yellow clay that has strong brown, red, and light gray mottles. It is about 15 inches thick. The lower part of the subsoil to a depth of 63 inches or more is light gray sandy clay loam that has strong brown and red mottles. In some areas the surface layer is sandy loam.

Permeability is slow in the Gibney soil. Available water capacity is high. The effective rooting depth is limited by saturation for brief or long periods following episodes of heavy rain from December through April. The saturated zone starts between the depths of 24 and 48 inches and extends to a depth of more than 60 inches. Surface runoff is slow or medium, and the hazard of water erosion is slight or moderate if the surface is left bare.

This unit is used for homesite development, for wildlife habitat, or as watershed.

The main limitations affecting homesite development are the seasonally saturated soil conditions and the slow permeability in the subsoil. Low strength is also a limitation in areas of the Shinglemill soil. The design of buildings and roads should offset the limited ability of the Shinglemill soil to support a load. Surface drainage may be needed for roads and buildings. The restricted permeability in the subsoil and the saturated soil conditions increase the possibility of failure of septic tank absorption fields. Alternative systems may be needed, such as those in which leach lines are placed in a mound above the soil surface.

The capability classification is IIIw-2(4), nonirrigated.

200—Shortyork-Tyson-Witherell complex, 30 to 50 percent slopes

This map unit is on mountains. The vegetation is mainly annual grasses and forbs on the Shortyork and Witherell soils and hardwoods on the Tyson soil. Elevation ranges from 2,000 to 4,000 feet. The average annual precipitation is 60 to 70 inches, the average annual air temperature is about 56 degrees F, and the average frost-free period is 150 to 250 days.

This unit is about 35 percent Shortyork loam, 35 percent Tyson gravelly loam, and 15 percent Witherell loam. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Bearwallow, Squawrock, Yorkville, and Yorktree soils and areas of Rock outcrop. Also included are small areas that have slopes of 15 to 30 percent or 50 to 75 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

The Shortyork soil is moderately deep to bedrock and is well drained. It formed in material derived dominantly from schist and sandstone. Typically, the surface layer is brown loam about 4 inches thick. The subsoil is yellowish brown very cobbly clay loam and very gravelly clay loam about 17 inches thick. The substratum is very pale brown extremely gravelly sandy loam about 10 inches thick. Hard, fractured schist is at a depth of about 31 inches. In some areas the surface layer is gravelly loam.

Permeability is moderately slow in the Shortyork soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

The Tyson soil is moderately deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with leaves and twigs about $^1/_2$ inch thick. The surface layer is dark grayish brown gravelly loam about 4 inches thick. The next layer is dark brown very gravelly loam about 5 inches thick. The upper 8 inches of the subsoil is brown very gravelly loam. The lower 4 inches is pale brown very gravelly clay loam. Hard, fractured sandstone is at a depth of about 21 inches.

Permeability is moderate in the Tyson soil. Available water capacity is very low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

The Witherell soil is shallow to bedrock and is somewhat excessively drained. It formed in material derived dominantly from sandstone. Typically, the surface layer is brown loam about 1 inch thick. The subsoil is light yellowish brown loam about 11 inches thick. Hard, fractured sandstone is at a depth of about 12 inches. In some areas the surface layer is gravelly loam.

Permeability is moderate in the Witherell soil. Available water capacity is very low. The effective rooting depth is limited by bedrock at a depth of 10 to 20 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

The Shortyork and Witherell soils are used for livestock grazing. The Tyson soil is used for firewood production. This unit is also used as wildlife habitat or watershed.

The characteristic plant community on the Shortyork soil is mainly red fescue, California oatgrass, ripgut brome, and soft chess. The slope is the main limitation affecting range management. It limits access by livestock and results in overgrazing of the less sloping areas. Fencing and water development can improve the distribution of livestock.

The characteristic plant community on the Witherell soil is mainly soft chess, filaree, and wild oat. The main limitations affecting range management are the slope and the effective rooting depth. The slope limits access by livestock and results in overgrazing of the less sloping areas. Fencing and water development can improve the distribution of livestock. The production of forage on the Witherell soil is limited by the shallow effective rooting depth. If seeding is considered, species that are tolerant of droughty conditions should be selected.

Oregon white oak is the main tree species on the Tyson soil. This soil can produce about 10 to 12 cords of wood per acre from a stand of trees 50 years old.

The main limitations affecting the harvesting of firewood are the slope, the hazard of erosion, and seasonal wetness. Wheeled and tracked equipment can be used in the more gently sloping areas, but cable yarding systems generally cause less disturbance of the soil in the steeper areas. Disturbance of the protective layer of duff can be minimized by the careful use of either wheeled and tracked equipment or cable yarding systems. Unless adequate plant cover or water bars are provided, steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying. Establishing plant cover on steep cut and fill slopes reduces the hazard of surface erosion. Using wheeled and tracked equipment when the soil is wet produces ruts, compacts the surface, and can damage the roots of trees. Roads may fail and landslides may occur following deep soil disturbance on this unit. Roads on this unit are dusty when dry. Surface treatment may be desirable during periods of heavy use. Unsurfaced roads and skid trails are slippery when wet. They may be impassable during rainy periods. Suitable surfacing of roads is needed for use during wet seasons. Rock for construction of roads generally is available in areas of this unit. After they are cut, hardwoods can regenerate by sprouting. Regrowth is most successful if cutting is done between December and May.

Among the common forest understory plants are blue wildrye, bedstraw, brodiaea, lupine, and annual grasses.

The capability classification is VIe(15), nonirrigated.

201—Shortyork-Yorkville-Witherell complex, 9 to 15 percent slopes

This map unit is on mountains. The vegetation is mainly perennial grasses on the Shortyork and Yorkville soils and annual grasses and forbs on the Witherell soil. Elevation ranges from 1,600 to 4,000 feet. The average annual precipitation is 60 to 70 inches, the average annual air temperature is about 57 degrees F, and the average frost-free period is 150 to 250 days.

This unit is about 40 percent Shortyork loam, 25 percent Yorkville clay loam, and 15 percent Witherell loam. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Bearwallow, Squawrock, Yorktree, and Tyson soils and areas of Rock outcrop. Also included are small areas that have slopes of 5 to 9 percent or 15 to 30 percent. Included areas make up about 20 percent of the total acreage of the unit. The percentage varies from one area to another.

The Shortyork soil is moderately deep to bedrock and is well drained. It formed in material derived from schist or sandstone. Typically, the surface layer is brown loam about 4 inches thick. The subsoil is yellowish brown very cobbly clay loam and very gravelly clay loam about 17 inches thick. The substratum is very pale brown extremely gravelly sandy loam about 10 inches thick. Hard, fractured schist is at a depth of about 31 inches. In some areas the surface layer is gravelly loam.

Permeability is moderately slow in the Shortyork soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is medium, and the hazard of water erosion is moderate if the surface is left bare.

The Yorkville soil is very deep to weathered bedrock and is moderately well drained. It formed in material derived from schist. Typically, the surface layer is very dark grayish brown clay loam about 12 inches thick. The upper 5 inches of the subsoil is very dark grayish brown clay. The lower 45 inches is grayish brown clay that has reddish yellow mottles. In some areas the surface layer is clay.

Permeability is very slow in the Yorkville soil. Available water capacity is high. The effective rooting depth is limited by weathered bedrock at a depth of 60 to 80 inches. During periods of intensive rainfall, the soil is partially saturated above the subsoil for very brief periods from December through April. The soil is also subject to landsliding and slumping. Surface runoff is medium, and the hazard of water erosion is moderate if the surface is left bare.

The Witherell soil is shallow to bedrock and is somewhat excessively drained. It formed in material derived from sandstone. Typically, the surface layer is brown loam about 1 inch thick. The subsoil is light yellowish brown loam about 11 inches thick. Hard, fractured sandstone is at a depth of about 12 inches. In some areas the surface layer is gravelly loam.

Permeability is moderate in the Witherell soil. Available water capacity is very low. The effective rooting depth is limited by bedrock at a depth of 10 to 20 inches. Surface runoff is medium, and the hazard of water erosion is moderate if the surface is left bare.

This unit is used for livestock grazing or wildlife habitat.

The characteristic plant community on the Shortyork soil is mainly red fescue, California oatgrass, ripgut brome, and soft chess. Soil properties generally do not limit range management practices on this soil.

The characteristic plant community on the Yorkville soil is California oatgrass, purple needlegrass, soft chess, and wild oat. The main limitation affecting range management is the seasonal wetness, which can limit the use of equipment to dry periods. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

The characteristic plant community on the Witherell soil is mainly soft chess, filaree, and wild oat. The main limitation affecting range management is the shallow effective rooting depth, which limits the production of forage. If seeding is considered, species that are tolerant of droughty conditions should be selected.

The capability classification is VIe(15), nonirrigated.

202—Shortyork-Yorkville-Witherell complex, 15 to 30 percent slopes

This map unit is on mountains. The vegetation is mainly perennial grasses on the Shortyork and Yorkville soils and annual grasses and forbs on the Witherell soil. Elevation ranges from 1,600 to 4,000 feet. The average annual precipitation is 60 to 70 inches, the average annual air temperature is about 57 degrees F, and the average frost-free period is 150 to 250 days.

This unit is about 40 percent Shortyork loam, 25 percent Yorkville clay loam, and 15 percent Witherell

loam. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Bearwallow, Squawrock, Yorktree, and Tyson soils and areas of Rock outcrop. Also included are small areas that have slopes of 9 to 15 percent or 30 to 50 percent. Included areas make up about 20 percent of the total acreage of the unit. The percentage varies from one area to another.

The Shortyork soil is moderately deep to bedrock and is well drained. It formed in material derived from schist or sandstone. Typically, the surface layer is brown loam about 4 inches thick. The subsoil is yellowish brown very cobbly clay loam and very gravelly clay loam about 17 inches thick. The substratum is very pale brown extremely gravelly sandy loam about 10 inches thick. Hard, fractured schist is at a depth of about 31 inches. In some areas the surface layer is gravelly loam.

Permeability is moderately slow in the Shortyork soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is rapid, and the hazard of water erosion is moderate if the surface is left bare.

The Yorkville soil is very deep to weathered bedrock and is moderately well drained. It formed in material derived from schist. The surface layer is very dark grayish brown clay loam about 12 inches thick. The upper 5 inches of the subsoil is very dark grayish brown clay. The lower 45 inches is grayish brown clay that has reddish yellow mottles. In some areas the surface layer is clay.

Permeability is very slow in the Yorkville soil. Available water capacity is high. The effective rooting depth is limited by weathered bedrock at a depth of 60 to 80 inches. During periods of intensive rainfall, the soil is partially saturated above the subsoil for very brief periods from December through April. The soil is also subject to landsliding and slumping. Surface runoff is rapid, and the hazard of water erosion is moderate if the surface is left bare.

The Witherell soil is shallow to bedrock and is somewhat excessively drained. It formed in material derived from sandstone. The surface layer is brown loam about 1 inch thick. The subsoil is light yellowish brown loam about 11 inches thick. Hard, fractured sandstone is at a depth of about 12 inches. In some areas the surface layer is gravelly loam.

Permeability is moderate in the Witherell soil. Available water capacity is very low. The effective rooting depth is limited by bedrock at a depth of 10 to 20 inches. Surface runoff is rapid, and the hazard of water erosion is moderate if the surface is left bare.

This unit is used for livestock grazing or wildlife habitat.

The characteristic plant community on the Shortyork soil is mainly red fescue, California oatgrass, ripgut brome, and soft chess. Soil properties generally do not limit range management practices on this soil.

The characteristic plant community on the Yorkville soil is mainly California oatgrass, purple needlegrass, soft chess, and wild oat. The main limitation affecting range management is the seasonal wetness, which limits the use of equipment to dry periods. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

The characteristic plant community on the Witherell soil is mainly soft chess, filaree, and wild oat. The main limitation affecting range management is the shallow effective rooting depth, which limits the production of forage. If seeding is considered, species that are tolerant of droughty conditions should be selected.

The capability classification is VIe(15), nonirrigated.

203—Shortyork-Yorkville-Witherell complex, 30 to 50 percent slopes

This map unit is on mountains. The vegetation is mainly perennial grasses on the Shortyork and Yorkville soils and annual grasses and forbs on the Witherell soil. Elevation ranges from 1,600 to 4,000 feet. The average annual precipitation is 60 to 70 inches, the average annual air temperature is about 57 degrees F, and the average frost-free period is 150 to 250 days.

This unit is about 40 percent Shortyork loam, 25 percent Yorkville clay loam, and 15 percent Witherell loam. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Bearwallow, Squawrock, Yorktree, and Tyson soils and areas of Rock outcrop. Also included are small areas that have slopes of 15 to 30 percent or 50 to 75 percent. Included areas make up about 20 percent of the total acreage of the unit. The percentage varies from one area to another.

The Shortyork soil is moderately deep to bedrock and is well drained. It formed in material derived from schist or sandstone. Typically, the surface layer is brown loam about 4 inches thick. The subsoil is yellowish brown very cobbly clay loam and very

gravelly clay loam about 17 inches thick. The substratum is very pale brown extremely gravelly sandy loam about 10 inches thick. Hard, fractured schist is at a depth of about 31 inches. In some areas the surface layer is gravelly loam.

Permeability is moderately slow in the Shortyork soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

The Yorkville soil is very deep to weathered bedrock and is moderately well drained. It formed in material derived from schist. The surface layer is very dark grayish brown clay loam about 12 inches thick. The upper 5 inches of the subsoil is very dark grayish brown clay. The lower 45 inches is grayish brown clay that has reddish yellow mottles. In some areas the surface layer is clay.

Permeability is very slow in the Yorkville soil. Available water capacity is high. The effective rooting depth is limited by weathered bedrock at a depth of 60 to 80 inches. During periods of intensive rainfall, the soil is partially saturated above the subsoil for very brief periods from December through April. The soil is also subject to landsliding and slumping. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

The Witherell soil is shallow to bedrock and is somewhat excessively drained. It formed in material derived from sandstone. The surface layer is brown loam about 1 inch thick. The subsoil is light yellowish brown loam about 11 inches thick. Hard, fractured sandstone is at a depth of about 12 inches. In some areas the surface layer is gravelly loam.

Permeability is moderate in the Witherell soil. Available water capacity is very low. The effective rooting depth is limited by bedrock at a depth of 10 to 20 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

This unit is used for livestock grazing or wildlife habitat.

The characteristic plant community on the Shortyork soil is mainly red fescue, California oatgrass, ripgut brome, and soft chess. The slope is the main limitation affecting range management. It limits access by livestock and results in overgrazing of the less sloping areas. Fencing and water development can improve the distribution of livestock.

The characteristic plant community on the Yorkville soil is mainly California oatgrass, purple needlegrass, soft chess, and wild oat. The main limitations affecting range management are the slope and the seasonally saturated soil conditions. The extended periods of seasonal saturation can limit the use of equipment. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock. The slope limits access by livestock and results in overgrazing of the less sloping areas. Fencing and water development can improve the distribution of livestock.

The characteristic plant community on the Witherell soil is mainly soft chess, filaree, and wild oat. The main limitations affecting range management are the slope and the effective rooting depth. The slope limits access by livestock and results in overgrazing of the less sloping areas. Fencing and water development can improve the distribution of livestock.

The production of forage on the Witherell soil is limited by the shallow effective rooting depth. If seeding is considered, species that are tolerant of droughty conditions should be selected.

The capability classification is VIe(15), nonirrigated.

204—Sirdrak loamy sand, 0 to 15 percent slopes

This very deep, somewhat excessively drained soil is on stabilized sand dunes. It formed in eolian sands. The vegetation is mainly perennial grasses and forbs and scattered redwoods. Elevation ranges from 30 to 250 feet. The average annual precipitation is 35 to 45 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 250 to 330 days.

Typically, the surface layer is brown loamy sand about 11 inches thick. The underlying material to a depth of 65 inches or more is yellowish brown, pale yellow, and light gray loamy sand and sand. In some areas the surface layer is sandy loam.

Included with this soil in mapping are small areas of Cabrillo, Heeser, and Mackerricher soils and Tropaquepts. These soils make up about 20 percent of the total acreage of the unit.

Permeability is rapid in the Sirdrak soil. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Surface runoff is slow or medium, and the hazard of water erosion is slight or moderate if the surface is left bare.

This unit is used mainly for homesite development or wildlife habitat. A few areas are used for recreation.

The main limitations affecting homesite development are the slope, the poor filtering capacity in the substratum, and the sloughing of cutbanks.

Excavations for roads and buildings increase the hazard of erosion. Revegetating disturbed areas around construction sites as soon as possible helps to control erosion. The design of access roads should control surface runoff and help to stabilize cut slopes. The poor filtering capacity increases the possibility of failure of septic tank absorption fields. Alternative systems may be needed, such as systems that increase separation distances from ground water. If the density of housing is moderate or high, community sewage systems are needed to prevent the contamination of water supplies resulting from seepage.

Windbreaks may be desirable on this unit to protect buildings, livestock, and fields from prevailing winds. The main limitation affecting the establishment of windbreaks is droughtiness in the upper 24 inches. Supplemental irrigation may be needed when windbreaks are established and during dry periods. Among the trees that are suitable for planting are eucalyptus, Monterey cypress, Monterey pine, and bishop pine.

The capability classification is IIIe-4(4), nonirrigated.

205—Squawrock-Garcia-Witherell complex, 15 to 50 percent slopes

This map unit is on hills and mountains. The vegetation is mainly annual grasses and forbs on the Squawrock and Witherell soils and hardwoods on the Garcia soil. Elevation ranges from 800 to 2,500 feet. The average annual precipitation is 45 to 60 inches, the average annual air temperature is about 57 degrees F, and the average frost-free period is about 150 to 250 days.

This unit is about 40 percent Squawrock gravelly loam, 25 percent Garcia loam, and 20 percent Witherell loam. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Hopland, Yorktree, Yorkville, and Bearwallow soils and areas of Rock outcrop. Also included are small areas that have slopes of 9 to 15 percent or 50 to 75 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

The Squawrock soil is moderately deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface layer is pale brown gravelly loam about 7 inches thick. The upper 11 inches of the subsoil is pale brown very gravelly loam. The lower 14 inches is very pale brown very gravelly clay loam. Hard, fractured sandstone is at a depth of about 32 inches. In some areas the surface layer is loam.

Permeability is moderate in the Squawrock soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is rapid, and the hazard of water erosion is moderate or severe if the surface is left bare.

The Garcia soil is moderately deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is dark grayish brown loam about 11 inches thick. The upper 8 inches of the subsoil is yellowish brown loam. The lower 9 inches is very pale brown gravelly clay loam. Hard, fractured sandstone is at a depth of about 28 inches.

Permeability is moderate in the Garcia soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is rapid, and the hazard of water erosion is moderate or severe if the surface is left bare.

The Witherell soil is shallow to bedrock and is somewhat excessively drained. It formed in material derived from sandstone. Typically, the surface layer is brown loam about 1 inch thick. The subsoil is light yellowish brown loam about 11 inches thick. Hard, fractured sandstone is at a depth of about 12 inches. In some areas the surface layer is gravelly loam.

Permeability is moderate in the Witherell soil. Available water capacity is very low. The effective rooting depth is limited by bedrock at a depth of 10 to 20 inches. Surface runoff is rapid, and the hazard of water erosion is moderate or severe if the surface is left bare.

The Squawrock and Witherell soils are used for livestock grazing. The Garcia soil is used for limited firewood and timber production. This unit is also used as wildlife habitat or as watershed.

The characteristic plant community on the Squawrock soil is mainly wild oat, soft chess, and filaree. The main limitations affecting range management are the slope and the low available water capacity. The slope limits access by livestock and results in overgrazing of the less sloping areas. Fencing, water development, and the strategic location of salt blocks can improve the distribution of livestock. The production of forage on the Squawrock soil is limited by the amount of moisture available for plant growth. If seeding is considered, species that are tolerant of droughty conditions should be selected.

The characteristic plant community on the Witherell soil is mainly soft chess, filaree, and wild oat. The main limitations affecting range management are the slope and the effective rooting depth. The slope limits access by livestock and results in overgrazing of the less sloping areas. Fencing, water development, and the strategic location of salt blocks can improve the distribution of livestock. The production of forage on the Witherell soil is limited by the shallow effective rooting depth. If seeding is considered, species that are tolerant of droughty conditions should be selected.

Tanoak and canyon live oak are the main tree species on the Garcia soil. Trees of limited extent include Douglas-fir and bigleaf maple. Estimates of the site index and potential annual production for Douglas-fir have not been made. Stands of conifers commonly are small and widely scattered; thus, they generally are not of commercial value.

The main limitations affecting the harvesting of timber are the slope, the hazard of erosion, and the low volume of commercial species. Because of these limitations, harvesting of trees is generally not feasible on this unit.

Among the common forest understory plants are California hazel and tanoak.

The capability classification is VIe(15), nonirrigated.

206—Squawrock-Garcia-Witherell complex, 50 to 75 percent slopes

This map unit is on hills and mountains. The vegetation is mainly annual grasses and forbs on the Squawrock and Witherell soils and hardwoods on the Garcia soil. Elevation ranges from 800 to 2,500 feet. The average annual precipitation is 45 to 60 inches, the average annual air temperature is about 57 degrees F, and the average frost-free period is about 150 to 250 days.

This unit is about 35 percent Squawrock gravelly loam, 30 percent Garcia loam, and 20 percent Witherell loam. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Hopland, Yorkville, and Bearwallow soils and areas of Rock outcrop. Also included are small areas that have slopes of 30 to 50 percent or 75 to 99 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

The Squawrock soil is moderately deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface layer is pale brown gravelly loam about 7 inches thick. The upper 11 inches of the subsoil is pale brown very gravelly loam. The lower 14 inches is very pale brown and yellowish brown very gravelly clay loam. Hard, fractured sandstone is at a depth of about 32 inches. In some areas the surface layer is loam.

Permeability is moderate in the Squawrock soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

The Garcia soil is moderately deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is dark grayish brown loam about 11 inches thick. The upper 8 inches of the subsoil is yellowish brown loam. The lower 9 inches is very pale brown gravelly clay loam. Hard, fractured sandstone is at a depth of about 28 inches.

Permeability is moderate in the Garcia soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

The Witherell soil is shallow to bedrock and is somewhat excessively drained. It formed in material derived from sandstone. Typically, the surface layer is brown loam about 1 inch thick. The subsoil is light yellowish brown loam about 11 inches thick. Hard, fractured sandstone is at a depth of about 12 inches. In some areas the surface layer is gravelly loam.

Permeability is moderate in the Witherell soil. Available water capacity is very low. The effective rooting depth is limited by bedrock at a depth of 10 to 20 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

The Squawrock and Witherell soils are used for livestock grazing. The Garcia soil is used for limited firewood and timber production. This unit is also used as wildlife habitat or as watershed.

The characteristic plant community on the Squawrock soil is mainly wild oat, soft chess, and filaree. The main limitations affecting range management are the slope and the low available water capacity. The slope limits access by livestock and results in overgrazing of the less sloping areas. Fencing, water development, and the strategic location of salt blocks can improve the distribution of

livestock. The production of forage on the Squawrock soil is limited by the amount of moisture available for plant growth. If seeding is considered, species that are tolerant of droughty conditions should be selected.

The characteristic plant community on the Witherell soil is mainly soft chess, filaree, and wild oat. The main limitations affecting range management are the slope and the effective rooting depth. The slope limits access by livestock and results in overgrazing of the less sloping areas. Fencing, water development, and the strategic location of salt blocks can improve the distribution of livestock. The production of forage on the Witherell soil is limited by the shallow effective rooting depth. If seeding is considered, species that are tolerant of droughty conditions should be selected.

Tanoak and canyon live oak are the main tree species on the Garcia soil. Trees of limited extent include Douglas-fir and bigleaf maple. Estimates of the site index and potential annual production for Douglas-fir have not been made. Stands of conifers commonly are small and widely scattered; thus, they generally are not of commercial value.

The main limitations affecting the harvesting of trees are the slope, the hazard of erosion, and the low volume of commercial species. Roads may fail and landslides may occur following deep soil disturbance on this unit. Because of these limitations, harvesting of trees is generally not feasible on this unit.

Among the common forest understory plants are California hazel and tanoak.

The capability classification is VIIe(15), nonirrigated.

207—Squawrock-Witherell complex, 15 to 50 percent slopes

This map unit is on hills and mountains. The vegetation is mainly annual grasses and forbs. Elevation ranges from 350 to 2,500 feet. The average annual precipitation is 45 to 60 inches, the average annual air temperature is about 57 degrees F, and the average frost-free period is 150 to 250 days.

This unit is about 55 percent Squawrock gravelly loam and 30 percent Witherell loam. The Squawrock and Witherell soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Garcia, Hopland, Bearwallow, and Yorkville soils and areas of Rock outcrop. Also included are small areas that have slopes of 9 to 15 percent or 50 to 75 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

The Squawrock soil is moderately deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface layer is pale brown gravelly loam about 7 inches thick. The upper 11 inches of the subsoil is pale brown very gravelly loam. The lower 14 inches is very pale brown very gravelly clay loam. Hard, fractured sandstone is at a depth of about 32 inches. In some areas the surface layer is loam.

Permeability is moderate in the Squawrock soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is rapid, and the hazard of water erosion is moderate or severe if the surface is left bare.

The Witherell soil is shallow to bedrock and is somewhat excessively drained. It formed in material derived from sandstone. Typically, the surface layer is brown loam about 1 inch thick. The subsoil is light yellowish brown loam about 11 inches thick. Hard, fractured sandstone is at a depth of about 12 inches. In some areas the surface layer is gravelly loam.

Permeability is moderate in the Witherell soil. Available water capacity is very low. The effective rooting depth is limited by bedrock at a depth of 10 to 20 inches. Surface runoff is rapid, and the hazard of water erosion is moderate or severe if the surface is left bare.

This unit is used for livestock grazing or wildlife habitat.

The characteristic plant community on the Squawrock soil is mainly wild oat, soft chess, and filaree. The main limitations affecting range management are the slope and the low available water capacity. The slope limits access by livestock and results in overgrazing of the less sloping areas. Fencing, water development, and the strategic location of salt blocks can improve the distribution of livestock. The production of forage on the Squawrock soil is limited by the amount of moisture available for plant growth. If seeding is considered, species that are tolerant of droughty conditions should be selected.

The characteristic plant community on the Witherell soil is mainly soft chess, filaree, and wild oat. The main limitations affecting range management are the slope and the effective rooting depth. The slope limits access by livestock and results in overgrazing of the less sloping areas. Fencing, water development, and the strategic location of salt blocks

can improve the distribution of livestock. The production of forage on the Witherell soil is limited by the shallow effective rooting depth. If seeding is considered, species that are tolerant of droughty conditions should be selected.

The capability classification is VIe(15), nonirrigated.

208—Squawrock-Witherell complex, 50 to 75 percent slopes

This map unit is on hills and mountains. The vegetation is mainly annual grasses and forbs. Elevation ranges from 350 to 2,500 feet. The average annual precipitation is 45 to 60 inches, the average annual air temperature is about 57 degrees F, and the average frost-free period is 150 to 250 days.

This unit is about 45 percent Squawrock gravelly loam and 40 percent Witherell loam. The Squawrock and Witherell soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Garcia, Hopland, and Bearwallow soils and areas of Rock outcrop. Also included are small areas that have slopes of 30 to 50 percent or 75 to 99 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

The Squawrock soil is moderately deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface layer is pale brown gravelly loam about 7 inches thick. The upper 11 inches of the subsoil is pale brown very gravelly loam. The lower 14 inches is very pale brown very gravelly clay loam. Hard, fractured sandstone is at a depth of about 32 inches. In some areas the surface layer is loam.

Permeability is moderate in the Squawrock soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

The Witherell soil is shallow to bedrock and is somewhat excessively drained. It formed in material derived dominantly from sandstone. Typically, the surface layer is brown loam about 1 inch thick. The subsoil is light yellowish brown loam about 11 inches thick. Hard, fractured sandstone is at a depth of about 12 inches. In some areas the surface layer is gravelly loam.

Permeability is moderate in the Witherell soil. Available water capacity is very low. The effective rooting depth is limited by bedrock at a depth of 10 to 20 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

This unit is used for livestock grazing or wildlife habitat.

The characteristic plant community on the Squawrock soil is mainly wild oat, soft chess, and filaree. The main limitations affecting range management are the slope and the low available water capacity. The slope limits access by livestock and results in overgrazing of the less sloping areas. Fencing, water development, and the strategic location of salt blocks can improve the distribution of livestock. The production of forage on the Squawrock soil is limited by the amount of moisture available for plant growth. If seeding is considered, species that are tolerant of droughty conditions should be selected.

The characteristic plant community on the Witherell soil is mainly soft chess, filaree, and wild oat. The main limitations affecting range management are the slope and the effective rooting depth. The slope limits access by livestock and results in overgrazing of the less sloping areas. Fencing, water development, and the strategic location of salt blocks can improve the distribution of livestock. The production of forage on the Witherell soil is limited by the shallow effective rooting depth. If seeding is considered, species that are tolerant of droughty conditions should be selected.

The capability classification is VIIe(15), nonirrigated.

209—Stornetta fine sandy loam, 0 to 2 percent slopes

This very deep, moderately well drained soil is on flood plains. It formed in alluvium derived from mixed rock sources. The vegetation is mainly perennial grasses and forbs. Elevation ranges from 10 to 100 feet. The average annual precipitation is 35 to 45 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 250 to 330 days.

Typically, the surface layer is light yellowish brown fine sandy loam about 2 inches thick. The next 3 inches is light yellowish brown loam that has light brownish gray mottles. The underlying material to a depth of 62 inches or more is light yellowish brown and brown, stratified silt loam and loam.

Included with this soil in mapping are small areas of Tropaquepts and Riverwash and areas that are flooded only occasionally. Included areas make up

about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is moderate in the Stornetta soil. Available water capacity is high. The effective rooting depth is limited by saturation for brief or long periods following episodes of heavy rain from December through April. The saturated zone starts between the surface and a depth of 12 inches and extends to a depth of more than 60 inches. Surface runoff is ponded or slow, and the hazard of water erosion is slight if the surface is left bare. The soil is frequently flooded for brief periods from December through April.

This unit is used mainly for hay production or pasture. A few areas are used for vegetable production.

If this unit is used for hay production or pasture, the main limitation is the flooding. Wetness limits the choice of plants and the period of cutting. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and protect the soil from compaction. Grazing should be deferred when the surface layer is saturated.

The capability classification is IVw-2(4), irrigated and nonirrigated.

210—Talmage gravelly loam, 0 to 2 percent slopes

This very deep, somewhat excessively drained soil is on river terraces. It formed in alluvium derived from mixed rock sources. The vegetation in areas that are not cultivated is mainly annual grasses and forbs. Elevation ranges from 160 to 1,800 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is about 55 degrees F, and the average frost-free period is 150 to 250 days.

Typically, the surface layer is dark grayish brown and brown gravelly loam about 12 inches thick. The upper 7 inches of the underlying material is yellowish brown very gravelly loam. The lower part to a depth of 61 inches or more is light yellowish brown extremely gravelly loam.

Included with this soil in mapping are small areas of Feliz soils and Riverwash. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is moderately rapid in the Talmage soil. Available water capacity is low. The effective rooting depth is 60 inches or more. Surface runoff is very slow, and the hazard of water erosion is slight if the surface is left bare. Some areas are subject to very brief periods of rare flooding from December through April.

This unit is used for homesite development, hay production, or pasture.

This unit is unsuited to homesite development because of the hazard of flooding. In areas that are protected from flooding, the main limitation is the poor filtering capacity in the substratum. The poor filtering capacity can result in failure of septic tank absorption fields. Alternative systems may be needed, such as those that increase separation distances from ground water. Buildings should not be located near natural drainageways. If the density of housing is moderate or high, community sewage systems are needed to prevent the contamination of water supplies resulting from seepage.

If this unit is used for hay production or pasture, the main limitations are the moderately rapid permeability and the low available water capacity. Irrigation water should be applied in amounts sufficient to wet the root zone but small enough to minimize the leaching of plant nutrients.

The capability classification is IVs-4(14), irrigated and nonirrigated.

211—Threechop-Ornbaun complex, 9 to 30 percent slopes

This map unit is on ridgetops and the upper side slopes of hills and mountains. The vegetation is mainly Douglas-fir and redwood. Elevation ranges from 600 to 1,900 feet. The average annual precipitation is 50 to 70 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 220 to 320 days.

This unit is about 60 percent Threechop loam and 25 percent Ornbaun loam. The Threechop and Ornbaun soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Zeni soils and soils that have been altered by skid trails, landings, and roads. Also included are small areas that have slopes of 5 to 9 percent or 30 to 50 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

The Threechop soil is deep to weathered bedrock and is well drained. It formed in material derived from sandstone and mudstone. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is very pale brown loam about 8 inches thick. The upper 4 inches of the subsoil is very pale brown and reddish yellow clay

loam. The lower 30 inches is reddish yellow, yellowish red, pink, and very pale brown clay. Soft sandstone and mudstone bedrock is at a depth of about 42 inches. In some areas the surface layer is clay loam.

Permeability is moderately slow in the Threechop soil. Available water capacity is moderate. The effective rooting depth is limited by weathered bedrock at a depth of 40 to 60 inches. Runoff is medium or rapid, and the hazard of water erosion is moderate if the surface is left bare.

The Ornbaun soil is deep to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about $^1/_2$ inch thick. The surface layer is light yellowish brown loam about 3 inches thick. The upper 37 inches of the subsoil is light brown and reddish yellow loam. The next 19 inches is reddish yellow and pink clay loam. Soft, fractured sandstone is at a depth of about 59 inches.

Permeability is moderate in the Ornbaun soil. Available water capacity is high. The effective rooting depth is limited by weathered bedrock at a depth of 40 to 60 inches. Surface runoff is medium or rapid, and the hazard of water erosion is moderate if the surface is left bare.

This unit is used for timber production or as watershed.

Douglas-fir, redwood, and tanoak are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 151 on the Threechop soil and 155 on the Ornbaun soil. On the basis of a 100-year site curve, the mean site index for redwood is 144 on the Threechop soil and 152 on the Ornbaun soil. The potential annual production from a fully stocked stand of redwood is 1,180 board feet per acre on the Threechop soil and 1,305 board feet per acre on the Ornbaun soil.

The main limitation affecting the harvesting of timber is seasonal wetness. Using wheeled and tracked equipment when the soils are wet produces ruts, compacts the surface, and can damage the roots of trees. Disturbance of the protective layer of duff can be minimized by the careful use of wheeled and tracked equipment. Roads are dusty when dry. Surface treatment may be desirable during periods of heavy use. Unsurfaced roads and skid trails are slippery when wet. They may be impassable during rainy periods. Suitable surfacing of roads is needed for use during wet seasons. Rock for construction of roads generally is not available in areas of this unit. Roads may fail and landslides may occur following deep soil disturbance in the steeper areas. In areas where the subsoil and substratum are exposed, gullies form readily if runoff water is concentrated.

Plant competition is a concern affecting the production of timber. When openings are made in the canopy, invading brushy plants that are not controlled can delay the establishment of seedlings. Reforestation can be accomplished by planting redwood and Douglas-fir seedlings. If seed trees are present, natural reforestation by Douglas-fir occurs infrequently. Redwood can regenerate by sprouting after cutting. These sprouts seldom provide optimum stocking.

Among the common forest understory plants are California huckleberry, tanoak, rhododendron, and salal.

The capability classification is IVe-1(4), nonirrigated.

212—Tregoning-Cleone complex, 0 to 5 percent slopes

This map unit is on marine terraces. The vegetation is mainly bishop pine, Mendocino cypress, and huckleberry. Elevation ranges from 40 to 250 feet. The average annual precipitation is about 40 to 55 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is about 290 to 330 days.

This unit is about 60 percent Tregoning sandy loam and 20 percent Cleone loamy sand. The Tregoning and Cleone soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Blacklock, Cabrillo, Harecreek, and Heeser soils and Tropaquepts. Also included are small areas that have slopes of 5 to 9 percent. Included areas make up about 20 percent of the total acreage of the unit. The percentage varies from one area to another.

The Tregoning soil is moderately deep to a hardpan and is poorly drained. It formed in eolian sands. Typically, the surface is covered with a mat of litter about 2 inches thick. The surface layer is gray sandy loam about 9 inches thick. The subsurface layer is light gray sandy loam about 6 inches thick. The subsoil, from a depth of 15 to 23 inches, is light gray loamy sand that has very pale brown mottles. The next layer is a strongly cemented hardpan about 22 inches thick. The substratum to a depth of 62 inches or more is pale brown sand.

Permeability is very slow in the Tregoning soil. Available water capacity is very low or low. The

effective rooting depth is limited by a hardpan at a depth of 20 to 40 inches. The soil is saturated for long periods following episodes of heavy rain from December through April. The saturated zone starts between the depths of 12 and 30 inches and extends to the top of the hardpan. Surface runoff is very slow or slow, and the hazard of water erosion is slight if the surface is left bare.

The Cleone soil is very deep and is somewhat poorly drained. Typically, the surface layer is dark gray and gray loamy sand about 3 inches thick. The next 4 inches is variegated light yellowish brown and very pale brown sandy loam that has brownish yellow mottles. The upper 6 inches of the subsoil is pale brown gravelly sandy loam that has brownish yellow mottles. The next 15 inches is very pale brown and light yellowish brown sandy loam that has brownish yellow and yellowish brown mottles. The lower 12 inches of the subsoil is light yellowish brown loamy sand. The substratum to a depth of 62 inches or more is very pale brown sand that has light gray and brownish yellow mottles.

Permeability is moderately rapid in the Cleone soil. Available water capacity is moderate. The effective rooting depth is limited by saturation for brief or long periods following episodes of heavy rain from December through April. The saturated zone starts between the depths of 30 and 48 inches and extends to a depth of more than 60 inches. Surface runoff is very slow or slow, and the hazard of water erosion is slight if the surface is left bare.

This unit is used for homesite development, as wildlife habitat, or as watershed.

The main limitations affecting homesite development are the seasonal wetness in areas of both soils and the hardpan in the Tregoning soil. Surface drainage may be needed. The sloughing of cutbacks is also a limitation in areas used for roads or buildings. All of these limitations increase the possibility of failure of septic tank absorption fields. Alternative systems may be needed. On the Tregoning soil, these include systems that drain the subsoil and that establish the leach lines in a mound above the soil surface. On the Cleone soil, they include systems that increase separation distances from ground water. If the density of housing is moderate or high, community sewage systems are needed to prevent the contamination of water supplies resulting from seepage.

The capability classification is IVe-2(4), nonirrigated.

213—Tregoning-Cleone complex, 5 to 15 percent slopes

This map unit is on marine terraces. The vegetation is mainly bishop pine, Mendocino cypress, and huckleberry. Elevation ranges from 40 to 250 feet. The average annual precipitation is about 40 to 55 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is about 290 to 330 days.

This unit is about 55 percent Tregoning sandy loam and 25 percent Cleone loamy sand. The Tregoning and Cleone soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Blacklock, Cabrillo, Harecreek, and Heeser soils and Tropaquepts. Also included are small areas that have slopes of 2 to 5 percent. Included areas make up about 20 percent of the total acreage of the unit. The percentage varies from one area to another.

The Tregoning soil is moderately deep to a hardpan and is poorly drained. It formed in eolian sands. Typically, the surface is covered with a mat of litter about 2 inches thick. The surface layer is gray sandy loam about 9 inches thick. The subsurface layer also is gray sandy loam about 9 inches thick. The subsoil is light gray loamy sand that has very pale brown mottles. It is about 8 inches thick. The next layer is a strongly cemented hardpan about 22 inches thick. The substratum to a depth of 62 inches or more is pale brown sand.

Permeability is very slow in the Tregoning soil. Available water capacity is very low or low. The effective rooting depth is limited by a hardpan at a depth of 20 to 40 inches. The soil is saturated for long periods following episodes of heavy rain from December through April. The saturated zone starts between the depths of 12 and 30 inches and extends to the top of the hardpan. Surface runoff is medium, and the hazard of water erosion is moderate if the surface is left bare.

The Cleone soil is very deep and is somewhat poorly drained. Typically, the surface layer is dark gray and gray loamy sand about 3 inches thick. The next 4 inches is light yellowish brown and very pale brown sandy loam that has brownish yellow mottles. The upper 6 inches of the subsoil is pale brown gravelly sandy loam that has brownish yellow mottles. The next 15 inches is very pale brown and light yellowish brown sandy loam that has brownish yellow and yellowish brown mottles. The lower 12

inches of the subsoil is light yellowish brown loamy sand. The substratum to a depth of 62 inches or more is very pale brown sand that has light gray and brownish yellow mottles.

Permeability is moderately rapid in the Cleone soil. Available water capacity is moderate. The effective rooting depth is limited by saturation for brief or long periods following episodes of heavy rain from December through April. The saturated zone starts between the depths of 30 and 48 inches and extends to a depth of more than 60 inches. Surface runoff is medium, and the hazard of water erosion is moderate if the surface is left bare.

This unit is used for homesite development, as wildlife habitat, or as watershed.

The main limitations affecting homesite development are the slope and the seasonal wetness in areas of both soils and the hardpan in the Tregoning soil. The sloughing of cutbanks is also a limitation on this unit. Excavations for roads and buildings increase the hazard of erosion. Revegetating disturbed areas around construction sites as soon as possible helps to control erosion. The design of access roads should control surface runoff and help to stabilize cut slopes. Surface drainage may be needed for roads and buildings. The saturated soil conditions and the hardpan increase the possibility of failure of septic tank absorption fields. Alternative systems may be needed. On the Tregoning soil, these include systems that drain the subsoil and that establish the leach lines in a mound above the soil surface. On the Cleone soil, they include systems that increase separation distances from ground water. If the density of housing is moderate or high, community sewage systems are needed to prevent the contamination of water supplies resulting from seepage.

The capability classification is IVe-2(4), nonirrigated.

214—Tropaquepts, 0 to 15 percent slopes

These very deep, very poorly drained soils are on marine terraces at the heads of drainageways, along drainageways, or in shallow depressions. They formed in marine sediments. In some areas the vegetation is mainly dense stands of Mendocino cypress and Labrador tea. In other areas it is mainly perennial grasses, sedges, and waxmyrtle. Elevation ranges from sea level to 600 feet. The average annual precipitation is 40 to 65 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 250 to 365 days.

A representative profile has a surface layer of dark gray clay loam about 7 inches thick. The upper 17 inches of the subsoil is light gray clay that has brownish yellow mottles. The lower 5 inches is gray sandy clay loam. The substratum to a depth of 63 inches or more is light brownish gray, light gray, and pale yellow loamy sand and sand.

Included with these soils in mapping are small areas of Aborigine, Blacklock, Shinglemill, and Tregoning soils. These included soils make up about 20 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability and available water capacity are extremely variable in the Tropaquepts. The effective rooting depth is limited by continuous saturation from December through April. The saturated zone starts between the surface and a depth of 10 inches and extends to a depth of more than 60 inches. Water may be ponded on the surface for brief or long periods following episodes of heavy rain. Surface runoff ranges from ponded to medium, and the hazard of water erosion is slight or moderate if the surface is left bare.

This unit is used as wildlife habitat or as watershed.

The capability classification is VIII(4), nonirrigated.

215—Tyson-Updegraff complex, 9 to 30 percent slopes

This map unit is on mountains. The vegetation is mainly hardwoods and scattered conifers. Elevation ranges from 3,000 to 4,000 feet. The average annual precipitation is 60 to 70 inches, the average annual air temperature is about 54 degrees F, and the average frost-free period is 175 to 200 days.

This unit is about 60 percent Tyson gravelly loam and 25 percent Updegraff loam. The Tyson and Updegraff soils occur as areas so intricately intermingled that is was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Squawrock and Maymen soils. Also included are small areas that have slopes of 30 to 50 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

The Tyson soil is moderately deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about $^{1}/_{2}$ inch thick. The surface layer is dark grayish brown gravelly loam about 4 inches thick. The next layer is dark brown

very gravelly loam about 5 inches thick. The upper 8 inches of the subsoil is brown very gravelly loam. The lower 4 inches is pale brown very gravelly clay loam. Hard, fractured sandstone is at a depth of about 21 inches.

Permeability is moderate in the Tyson soil. Available water capacity is very low. The effective rooting depth is 20 to 40 inches. Surface runoff is medium or rapid, and the hazard of water erosion is slight or moderate if the surface is left bare.

The Updegraff soil is deep to bedrock and is well drained. It formed in material weathered from schist. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is grayish brown loam about 4 inches thick. The subsoil is grayish brown and pale brown clay loam about 49 inches thick. Hard, fractured schist is at a depth of about 53 inches.

Permeability is moderately slow in the Updegraff soil. Available water capacity is high. The effective rooting depth is limited by bedrock at a depth of 40 to 60 inches. Surface runoff is medium or rapid, and the hazard of water erosion is moderate if the surface is left bare.

This unit is used mainly for firewood production, as wildlife habitat, or as watershed. A few areas are used for limited timber production.

Oregon white oak is the main tree species on the Tyson soil. Volumes of 10 to 12 cords of wood per acre are common from stands of trees 50 years old. Oregon white oak, California black oak, California buckeye, and scattered Douglas-fir are the main tree species on the Updegraff soil. On the basis of a 50-year site curve, the mean site index for California black oak is 31 on the Updegraff soil. Volumes of 20 to 25 cords of wood per acre are common from stands of trees 50 years old. Stands of conifers are typically small and widely scattered; thus, they generally are not of commercial value.

The main limitation affecting the harvesting of firewood is the seasonal wetness. Using wheeled and tracked equipment when the soils are wet produces ruts, compacts the surface, and can damage the roots of trees.

Among the common forest understory plants are bedstraw, poison oak, and blue wildrye.

The capability classification is VIe(5), nonirrigated.

216—Tyson-Updegraff complex, 30 to 50 percent slopes

This map unit is on mountains. The vegetation is mainly hardwoods and scattered conifers. Elevation ranges from 3,000 to 4,000 feet. The average annual precipitation is 60 to 70 inches, the average annual air temperature is about 54 degrees F, and the average frost-free period is 175 to 200 days.

This unit is about 60 percent Tyson gravelly loam and 25 percent Updegraff loam. The Tyson and Updegraff soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Squawrock and Maymen soils. Also included are small areas that have slopes of 15 to 30 percent or 50 to 75 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

The Tyson soil is moderately deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1/2 inch thick. The surface layer is dark grayish brown gravelly loam about 4 inches thick. The next layer is dark brown very gravelly loam about 5 inches thick. The upper 8 inches of the subsoil is brown very gravelly loam. The lower 4 inches is pale brown very gravelly clay loam. Hard, fractured sandstone is at a depth of about 21 inches.

Permeability is moderate in the Tyson soil. Available water capacity is very low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

The Updegraff soil is deep to bedrock and is well drained. It formed in material weathered from schist. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is grayish brown loam about 4 inches thick. The subsoil is grayish brown and pale brown clay loam about 49 inches thick. Hard, fractured schist is at a depth of about 53 inches.

Permeability is moderately slow in the Updegraff soil. Available water capacity is high. The effective rooting depth is limited by bedrock at a depth of 40 to 60 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

This unit is used mainly for firewood production, as wildlife habitat, or as watershed. A few areas are used for limited timber production.

Oregon white oak is the main tree species on the Tyson soil. Volumes of 10 to 12 cords of wood per acre are common from stands of trees 50 years old on the Tyson soil. Oregon white oak, California black oak, California buckeye, and scattered Douglas-fir are the main tree species on the Updegraff soil. On the basis of a 50-year site curve, the mean site index for California black oak is 31 on the Updegraff soil.

Volumes of 20 to 25 cords of wood per acre are common from stands of trees 50 years old on the Updegraff soil. Stands of conifers are commonly small and widely scattered; thus, they generally are not of commercial value.

The main limitation affecting the harvesting of firewood is the slope. Wheeled and tracked equipment can be used in the more gently sloping areas, but cable yarding systems generally cause less disturbance of the soil in the steeper areas. Unless adequate plant cover or water bars are provided, steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying. Establishing plant cover on steep cut and fill slopes reduces the hazard of surface erosion. Revegetation of cut and fill slopes is difficult on the Tyson soil because of the amount of coarse fragments. Roads may fail and landslides may occur following deep soil disturbance, especially on the Updegraff soil. Unsurfaced roads and skid trails are slippery when wet. They may be impassable during rainy periods. Rock for construction of roads generally is available in areas of this unit.

Among the common forest understory plants are bedstraw, poison oak, and blue wildrye.

The capability classification is VIe(5), nonirrigated.

217—Updegraff loam, 30 to 50 percent slopes

This well drained soil is deep to bedrock. It is on hills and mountains. It formed in material derived from schist. The vegetation is mainly hardwoods and Douglas-fir. Elevation ranges from 600 to 2,000 feet. The average annual precipitation is 50 to 60 inches, the average annual air temperature is about 55 degrees F, and the average frost-free period is 150 to 250 days.

Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is grayish brown loam about 4 inches thick. The subsoil is grayish brown, pale brown, and light brownish gray clay loam about 49 inches thick. Hard, fractured schist is at a depth of about 53 inches.

Included with this soil in mapping are small areas of Yorkville, Woodin, Tyson, and Hopland soils. Also included are small areas that have slopes of 15 to 30 percent or 50 to 75 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is moderately slow in the Updegraff soil. Available water capacity is high. The effective rooting depth is limited by bedrock at a depth of 40 to 60 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

This unit is used for firewood, for limited timber production, as wildlife habitat, or as watershed.

Pacific madrone, Oregon white oak, and California black oak are the main tree species on this unit. Trees of limited extent include Douglas-fir and California buckeye. Volumes of 20 to 25 cords of wood per acre are common from stands of trees 50 years old.

The main limitations affecting the harvesting of firewood or timber are seasonal wetness and the slope. Roads may fail and landslides may occur following deep soil disturbance. Unsurfaced roads and skid trails are slippery when wet. They may be impassable during rainy periods. Rock for construction of roads is generally not available in areas of this unit. Unless adequate plant cover or water bars are provided, steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying. Establishing plant cover on steep cut and fill slopes reduces the hazard of erosion.

Hardwoods can regenerate by sprouting after cutting. Regrowth is most successful if cutting is done between December and May.

Among the common forest understory plants are blue wildrye, melic, and soft chess.

The capability classification is VIe(5), nonirrigated.

218—Updegraff-Hopland-Woodin complex, 30 to 50 percent slopes

This map unit is on hills and mountains. The vegetation is mainly hardwoods and Douglas-fir. Elevation ranges from 600 to 2,000 feet. The average annual precipitation is 50 to 60 inches, the average annual air temperature is about 55 degrees F, and the average frost-free period is 150 to 250 days.

This unit is about 30 percent Updegraff loam, 30 percent Hopland loam, and 15 percent Woodin extremely gravelly sandy loam. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Bearwallow, Garcia, Yorkville, Squawrock, and Tyson soils. Also included are small areas that have slopes of 15 to 30 percent or 50 to 75 percent. Included areas make up about 25 percent of the total acreage of the unit. The percentage varies from one area to another.

The Updegraff soil is deep to bedrock and is well drained. It formed in material weathered from schist. Typically, the surface is covered with a mat of leaves

and twigs about 1 inch thick. The surface layer is grayish brown loam about 4 inches thick. The subsoil is grayish brown and pale brown clay loam about 49 inches thick. Hard, fractured schist is at a depth of about 53 inches.

Permeability is moderately slow in the Updegraff soil. Available water capacity is high. The effective rooting depth is limited by bedrock at a depth of 40 to 60 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

The Hopland soil is moderately deep to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is yellowish brown loam about 15 inches thick. The subsoil is reddish yellow loam about 15 inches thick. Soft sandstone bedrock is at a depth of about 30 inches.

Permeability is moderately slow in the Hopland soil. Available water capacity is low. The effective rooting depth is limited by weathered bedrock at a depth of 20 to 40 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

The Woodin soil is moderately deep to bedrock and is well drained. It formed in material derived from sandstone. The surface layer is very dark brown extremely gravelly sandy loam about 6 inches thick. The subsoil is very pale brown extremely gravelly loam about 16 inches thick. Hard, fractured sandstone is at a depth of about 22 inches. In some areas the surface layer is very gravelly loam, very gravelly sandy loam, or extremely gravelly loam.

Permeability is moderate in the Woodin soil. Available water capacity is very low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

This unit is used for firewood, for limited timber production, as wildlife habitat, or as watershed.

Oregon white oak, California black oak, interior live oak, and Douglas-fir are the main tree species on this unit. On the basis of a 50-year site curve, the mean site index for California black oak is 31 on the Updegraff soil and 44 on the Hopland soil. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 97 on the Woodin soil. The Updegraff soil can produce about 20 to 25 cords per acre from a stand of trees 50 years old. The Hopland soil can produce about 30 to 35 cords per acre from a stand of trees 50 years old. The potential annual production from a fully stocked stand of Douglas-fir is 245 board feet per acre on the Woodin soil. This potential production is rarely achieved, however, because of the inherent tendency of the Woodin soil to produce understocked stands. Trees of limited extent include Pacific madrone.

The main limitations affecting the harvesting of firewood and timber are the slope, the hazard of erosion, and seasonal wetness. Wheeled and tracked equipment can be used in the more gently sloping areas, but cable yarding systems generally cause less disturbance of the soil in the steeper areas. Disturbance of the protective layer of duff can be minimized by the careful use of either wheeled and tracked equipment or cable yarding systems. Unless adequate plant cover or water bars are provided, steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying. Establishing plant cover on steep cut and fill slopes reduces the hazard of surface erosion on the Updegraff and Hopland soils. Revegetation of exposed subsoil is difficult on the Woodin soil; however, it generally is not needed for control of surface erosion because of the large amount of coarse fragments. Roads may fail and landslides may occur following deep soil disturbance on the Updegraff soil. Using wheeled and tracked equipment when the soil is wet produces ruts, compacts the surface, and can damage the roots of trees. Roads on this unit are dusty when dry. Surface treatment may be desirable during periods of heavy use. Unsurfaced roads and skid trails are slippery when wet. They may be impassable during rainy periods. Suitable surfacing of roads is needed for use during wet seasons. Rock for construction of roads is generally not available in areas of this unit.

Hardwoods can regenerate by sprouting after cutting. Regrowth is most successful if cutting is done between December and May. The high soil temperature and low content of soil moisture during the growing season result in a high mortality rate of planted seedlings.

Among the common forest understory plants are soft chess, blue wildrye, and melic.

The capability classification is VIe(5), nonirrigated.

219—Urban land

This map unit is on marine terraces. Slopes range from 0 to 15 percent.

About 50 percent of this unit is land covered by concrete, asphalt, buildings, and other impervious surfaces. About 25 percent consists of soils that have been altered by cutting, filling, and grading for housing developments, schools, industrial areas, or other uses.

Included in mapping are small areas of Heeser, Cabrillo, Biaggi, Cleone, Harecreek, Shinglemill,

Tregoning, and Gibney soils and Tropaquepts. These soils make up about 25 percent of the total acreage of the unit. The percentage varies from one area to another.

Drainage, permeability, surface runoff, and available water capacity are extremely variable in areas of this unit. Onsite investigation is needed to determine the potentials and limitations for any proposed use.

No capability classification is assigned.

220—Usal-Branscomb complex, 75 to 99 percent slopes

This map unit is on extremely steep hills. The vegetation is mainly redwood and Douglas-fir. Redwood trees do not occur in areas of this unit north of the Wheeler site (section 6, T. 13 N., R. 18 W.). Elevation ranges from 10 to 800 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 290 to 365 days.

This unit is about 60 percent Usal gravelly loam and 25 percent Branscomb very gravelly loam. The Usal and Branscomb soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Hotel soils and soils that have been drastically altered by logging activities. Also included are small areas that have slopes of 50 to 75 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

The Usal soil is moderately deep to bedrock and is well drained. It formed in material derived from sandstone and mudstone. Typically, the surface is covered with a mat of leaves and twigs about 2 inches thick. The surface layer is brown gravelly loam about 14 inches thick. The upper 15 inches of the subsoil is very pale brown and light yellowish brown gravelly clay loam. The lower 4 inches is light yellowish brown very gravelly clay loam. Hard, fractured sandstone and mudstone bedrock is at a depth of about 33 inches. In some areas the surface layer is loam.

Permeability is moderate in the Usal soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

The Branscomb soil is deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 2 inches thick. The surface layer is grayish brown very gravelly loam about 10 inches thick. The subsoil is pale brown very gravelly loam and very gravelly clay loam about 40 inches thick. Hard, fractured sandstone is at a depth of about 50 inches. In some areas the surface layer is gravelly loam.

Permeability is moderate in the Branscomb soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 40 to 60 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

This unit is used for timber production or as watershed.

Redwood and Douglas-fir are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index for redwood is 161 on the Usal soil and 178 on the Branscomb soil. The potential annual production from a fully stocked stand of redwood is 1,460 board feet per acre on the Usal soil and 1,815 board feet per acre on the Branscomb soil. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 174 on the Usal soil and 191 on the Branscomb soil. Trees of limited extent include grand fir and western hemlock.

The main limitations affecting the harvesting of timber are the slope and the hazard of erosion. Cable yarding systems generally are used on this unit. Harvesting systems that lift logs entirely off the ground minimize the disturbance of the protective layer of duff. Revegetation of exposed subsoil is difficult on this unit; however, it generally is not needed for control of surface erosion because of the large amount of coarse fragments. Roads may fail and landslides may occur following deep soil disturbance. Rock for construction of roads is generally available in areas of this unit. Rocks and loose soil material frequently slide onto roads. This hazard increases the need for maintenance.

Plant competition is a concern affecting the production of timber. When openings are made in the canopy, invading brushy plants that are not controlled can delay the establishment of seedlings. Reforestation can be accomplished by planting redwood or Douglas-fir seedlings. Natural reforestation by redwood sprouts and Douglas-fir seed trees provides variable stocking results. Both overstocked and understocked areas are common. Planting of redwood seedlings is not recommended in areas adjacent to the ocean that are subject to strong, persistent winds. Because of hot, dry winds

from the inland Eel River watershed, redwood plantings are less successful on this unit in the area between Wheeler and the Humboldt County line.

Among the common forest understory plants are swordfern, toothwort, and starflower.

The capability classification is VIIe(4), nonirrigated.

221—Vandamme loam, 9 to 30 percent slopes

This well drained soil is deep to weathered bedrock. It is on broad ridges and the upper side slopes of hills. It formed in material derived from sandstone. The vegetation is mainly redwood and Douglas-fir. Elevation ranges from 80 to 1,000 feet. The average annual precipitation is 40 to 70 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 290 to 365 days.

Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is pale brown, light yellowish brown, and brownish yellow loam about 9 inches thick. The upper 5 inches of the subsoil is light brown clay loam. The next 11 inches is reddish yellow and strong brown clay. The lower 17 inches of the subsoil is brownish yellow and strong brown clay loam. Soft, fractured sandstone is at a depth of about 42 inches. In some areas the surface layer is clay loam.

Included with this soil in mapping are small areas of Irmulco and Tramway soils and soils that have been altered by skid trails, landings, and roads. Also included are small areas that have slopes of 5 to 9 percent or 30 to 50 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is slow in the Vandamme soil. Available water capacity is moderate. The effective rooting depth is limited by weathered bedrock at a depth of 40 to 60 inches. Surface runoff is medium or rapid, and the hazard of water erosion is moderate if the surface is left bare.

This unit is used for timber production or as watershed.

Redwood, Douglas-fir, and tanoak are the main tree species on this soil. On the basis of a 100-year site curve, the mean site index is 165 for redwood and 179 for Douglas-fir. The potential annual production for redwood is 1,545 board feet per acre from a fully stocked stand of trees. Trees of limited extent include grand fir, western hemlock, and Pacific madrone.

The main limitation affecting the harvesting of timber is seasonal wetness. Using wheeled and tracked equipment when the soil is wet produces ruts, compacts the surface, and can damage the roots of trees. Disturbance of the protective layer of duff can be minimized by the careful use of wheeled and tracked equipment. Establishing plant cover on steep cut and fill slopes reduces the hazard of surface erosion. Roads may fail and landslides may occur following deep soil disturbance in the steeper areas. In areas where the subsoil is exposed along roads, gullies form readily where water flow is concentrated. Roads are dusty when dry. Surface treatment may be desirable during periods of heavy use. Unsurfaced roads and skid trails are slippery when wet. They may be impassable during rainy periods. Rock for construction of roads generally is not available in areas of this unit.

Plant competition is a concern affecting the production of timber. When openings are made in the canopy, invading brushy plants that are not controlled can delay the establishment of seedlings. Reforestation can be accomplished by planting redwood and Douglas-fir seedlings. Natural reforestation by redwood sprouts and Douglas-fir seed trees provides variable stocking results. Both overstocked and understocked areas are common.

Among the common forest understory plants are rhododendron, California huckleberry, and swordfern.

The capability classification is IVe-1(4), nonirrigated.

222—Vandamme-Caspar complex, 2 to 15 percent slopes

This map unit is on marine terraces. The vegetation is mainly redwood, Douglas-fir, and bishop pine. Elevation ranges from 750 to 850 feet. The average annual precipitation is 40 to 65 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 290 to 365 days.

This unit is about 50 percent Vandamme sandy loam and 35 percent Caspar sandy loam. The Vandamme and Caspar soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Quinliven, Ferncreek, and Irmulco soils. Also included are small areas that have slopes of 15 to 30 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

The Vandamme soil is deep to weathered bedrock and is well drained. It formed in material derived from

sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is light gray sandy loam about 9 inches thick. The upper 5 inches of the subsoil is light brown clay loam. The next 11 inches is reddish yellow and strong brown clay. The lower 17 inches of the subsoil is brownish yellow and strong brown clay loam. Soft, fractured sandstone is at a depth of about 42 inches.

Permeability is moderately slow in the Vandamme soil. Available water capacity is moderate. The effective rooting depth is limited by weathered bedrock at a depth of 40 to 60 inches. Surface runoff is slow or medium, and the hazard of water erosion is slight or moderate if the surface is left bare.

The Caspar soil is very deep and is well drained. It formed in marine sediments. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is gray and light gray sandy loam about 9 inches thick. The next layer is light gray and light yellowish brown sandy loam about 7 inches thick. The upper 21 inches of the subsoil is brownish yellow and yellowish brown sandy clay loam. The lower 11 inches is yellowish brown sandy clay. The substratum to a depth of 62 inches or more is brownish yellow sandy loam.

Permeability is moderately slow in the Caspar soil. Available water capacity is moderate or high. The effective rooting depth is 60 inches or more. Surface runoff is slow or medium, and the hazard of water erosion is slight or moderate if the surface is left bare.

This unit is used for timber production or as watershed.

Redwood, Douglas-fir, bishop pine, and tanoak are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index for redwood is 165 on the Vandamme soil and 125 on the Caspar soil. The potential annual production from a fully stocked stand of redwood is 1,545 board feet per acre on the Vandamme soil and 910 board feet per acre on the Caspar soil. Areas that are subject to strong, persistent winds, which limit tree height, are less productive than other areas of this unit. Trees of limited extent include western hemlock, grand fir, and Mendocino cypress.

The main limitation affecting the harvesting of timber is seasonal wetness. If it is exposed, the surface layer of these soils is subject to sheet and rill erosion. Disturbance of the protective layer of duff can be minimized by the careful use of wheeled and tracked equipment. Establishing plant cover on steep cut and fill slopes reduces the hazard of erosion. Another limitation is low bearing strength when the soils are saturated. Using wheeled and tracked equipment when the soils are moist produces ruts, compacts the surface, and can damage the roots of trees. Unsurfaced roads and skid trails are slippery and soft when wet. They may be impassable during rainy periods. Suitable surfacing of roads is needed for use during wet seasons. The design of roads should offset the limited ability of the soils to support a load. Roads are dusty when dry. Surface treatment may be desirable during periods of heavy use. Rock for construction of roads generally is not available in areas of this unit.

Plant competition is a concern affecting the production of timber. When openings are made in the canopy, invading brushy plants that are not controlled can delay the establishment of seedlings. The surface layer of these soils has a low capacity to hold nutrients and water. As a result, the establishment of seedlings may be difficult. Reforestation can be accomplished by planting redwood and Douglas-fir seedlings. Natural reforestation by redwood sprouts and Douglas-fir seed trees provides variable stocking results. Both overstocked and understocked areas are common.

Among the common forest understory plants are tanoak, brackenfern, bedstraw, salal, California huckleberry, and swordfern.

The capability classification is IIIe-1(4), nonirrigated.

223—Vandamme-Irmulco complex, 20 to 50 percent slopes

This map unit is on the upper side slopes of hills. The vegetation is mainly redwood and Douglas-fir. Elevation ranges from 80 to 800 feet. The average annual precipitation is 40 to 70 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 290 to 365 days.

This unit is about 40 percent Vandamme loam and 35 percent Irmulco loam. The Vandamme soil is in flat areas and on side slopes that are mainly less than 40 percent, and the Irmulco soil is on the steeper slopes. The Vandamme and Irmulco soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Tramway, Dehaven, and Hotel soils and small areas of soils that have been disturbed by skid trails, landings, and roads. Also included are small areas that have slopes of less than 30 percent or more than 50 percent. Included areas make up about 25 percent of the total acreage of the unit. The percentage varies from one area to another.

The Vandamme soil is deep and well drained. It formed in material derived dominantly from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is pale brown and brownish yellow loam about 9 inches thick. The upper 5 inches of the subsoil is light brown clay loam. The next 11 inches is reddish yellow and strong brown clay. The lower 17 inches of the subsoil is variegated brownish yellow and strong brown clay loam. Soft, fractured sandstone is at a depth of about 42 inches. The depth to soft sandstone ranges from 40 to 60 inches. In some areas the surface layer is clay loam.

Permeability is moderately slow in the Vandamme soil. Available water capacity is moderate or high. The effective rooting depth is 40 to 60 inches. Some roots penetrate to a greater depth by following fractures in the bedrock. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

The Irmulco soil is very deep and is well drained. It formed in material derived dominantly from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is pale brown loam about 6 inches thick. The upper 35 inches of the subsoil is light brown loam. The lower 20 inches is light brown, pink, and reddish yellow clay loam. Soft, fractured sandstone is at a depth of about 61 inches. The depth to soft sandstone ranges from 60 to 80 inches.

Permeability is moderate in the Irmulco soil. Available water capacity is moderate or high. The effective rooting depth is 60 to 80 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

This unit is used for timber production or as watershed.

Redwood and Douglas-fir are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index for redwood is 165. The potential annual production from a fully stocked stand of redwood is 1,545 board feet per acre. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 179 on the Vandamme soil and 191 on the Irmulco soil. Trees of limited extent include grand fir, western hemlock, tanoak, and Pacific madrone.

The main limitations affecting the harvesting of timber are the slope, the hazard of erosion, and seasonal wetness. Wheeled and tracked equipment can be used in the more gently sloping areas, but cable yarding systems generally cause less disturbance of the soil in the steeper areas. Disturbance of the protective layer of duff can be minimized by the careful use of either wheeled and tracked equipment or cable yarding systems. Unless adequate plant cover or water bars are provided, steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying. In areas where the subsoil is exposed along roads, gullies form readily where water flow is concentrated. Establishing plant cover on steep cut and fill slopes reduces the hazard of surface erosion. Using wheeled and tracked equipment when the soils are wet produces ruts, compacts the surface, and can damage the roots of trees. Roads may fail and landslides may occur following deep soil disturbance. Roads on this unit are dusty when dry. Surface treatment may be desirable during periods of heavy use. Unsurfaced roads and skid trails are slippery when wet. They may be impassable during rainy periods. Suitable surfacing of roads is needed for use during wet seasons. Rock for construction of roads generally is available in areas of this unit.

Plant competition is a concern affecting the production of timber. When openings are made in the canopy, invading brushy plants that are not controlled can delay the establishment of seedlings. Reforestation can be accomplished by planting redwood and Douglas-fir seedlings. Natural reforestation by redwood sprouts and Douglas-fir seed trees provides variable stocking results. Both overstocked and understocked areas are common.

Among the common forest understory plants are rhododendron, California huckleberry, swordfern, and trillium.

The capability classification is VIe(4), nonirrigated.

224—Vandamme-Irmulco-Tramway complex, 50 to 75 percent slopes

This map unit is on hills. The vegetation is mainly redwood and Douglas-fir. Elevation ranges from 80 to 800 feet. The average annual precipitation is 40 to 70 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 290 to 365 days.

This unit is about 30 percent Vandamme loam, 30 percent Irmulco loam, and 15 percent Tramway loam. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Dehaven and Hotel soils and small areas of soils that have been altered by skid trails, landings, and roads. Also included are small areas that have slopes of less than 50 percent or more than 75 percent. Included areas make up about 25 percent of

the total acreage of the unit. The percentage varies from one area to another.

The Vandamme soil is deep and well drained. It formed in material derived dominantly from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is pale brown and brownish yellow loam about 9 inches thick. The upper 5 inches of the subsoil is light brown clay loam. The next 11 inches is reddish yellow and strong brown clay. The lower 17 inches of the subsoil is variegated brownish yellow and strong brown clay loam. Soft, fractured sandstone is at a depth of about 42 inches. The depth to soft sandstone ranges from 40 to 60 inches. In some areas the surface layer is clay loam.

Permeability is moderately slow in the Vandamme soil. Available water capacity is moderate or high. The effective rooting depth is 40 to 60 inches. Some roots penetrate to a greater depth by following fractures in the bedrock. Surface runoff is very rapid, and the hazard of water erosion is severe if the surface is left bare.

The Irmulco soil is deep and well drained. It formed in material derived dominantly from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is pale brown loam about 6 inches thick. The subsoil is light brown, reddish yellow, and pink loam about 52 inches thick. Soft, fractured sandstone is at a depth of about 58 inches. The depth to soft sandstone ranges from 40 to 60 inches.

Permeability is moderate in the Irmulco soil. Available water capacity is moderate or high. The effective rooting depth is 40 to 60 inches. Some roots penetrate to a greater depth by following fractures in the bedrock. Surface runoff is very rapid, and the hazard of water erosion is severe if the surface is left bare.

The Tramway soil is moderately deep and is well drained. It formed in material derived dominantly from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 2 inches thick. The surface layer is light brownish gray loam about 7 inches thick. The upper 5 inches of the subsoil is pale brown loam. The lower 16 inches is light yellowish brown clay loam. Soft, fractured sandstone is at a depth of about 28 inches. The depth to soft sandstone ranges from 20 to 40 inches.

Permeability is moderate in the Tramway soil. Available water capacity is low or moderate. The effective rooting depth is 20 to 40 inches. Some roots penetrate to a greater depth by following fractures in the bedrock. Surface runoff is very rapid, and the hazard of water erosion is severe if the surface is left bare.

This unit is used for timber production or as watershed.

Redwood and Douglas-fir are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index for redwood is 165 on the Vandamme soil, 165 on the Irmulco soil, and 141 on the Tramway soil. The potential annual production from a fully stocked stand of redwood is 1,545 board feet per acre on the Vandamme and Irmulco soils and 1,460 board feet per acre on the Tramway soil. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 179 on the Vandamme soil, 191 on the Irmulco soil, and 161 on the Tramway soil. Trees of limited extent include grand fir, western hemlock, tanoak, and Pacific madrone.

The main limitations affecting the harvesting of timber are the slope, the hazard of erosion, and seasonal wetness. When timber is harvested, the slope limits the use of wheeled and tracked equipment in skidding operations. Cable yarding systems generally cause less disturbance of the soil. Unless adequate plant cover or water bars are provided, steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying. Harvesting systems that lift logs entirely off the ground minimize the disturbance of the protective layer of duff. Roads are dusty when dry. Surface treatment may be desirable during periods of heavy use. Establishing plant cover on steep cut and fill slopes reduces the hazard of surface erosion. Roads may fail and landslides may occur following deep soil disturbance. In areas where the subsoil is exposed along roads, gullies form readily where water flow is concentrated. Unsurfaced roads and skid trails are slippery when wet. They may be impassable during rainy periods. Suitable surfacing of roads is needed for use during wet seasons. Rock for construction of roads generally is not available in areas of this unit.

Plant competition is a concern affecting the production of timber. When openings are made in the canopy, invading brushy plants that are not controlled can delay the establishment of seedlings. Reforestation can be accomplished by planting redwood and Douglas-fir seedlings. Natural reforestation by redwood sprouts and Douglas-fir seed trees provides variable stocking results. Both overstocked and understocked areas are common.

Among the common forest understory plants are rhododendron, California huckleberry, swordfern, and trillium.

The capability classification is VIIe(4), nonirrigated.

225—Windyhollow loam, 0 to 5 percent slopes

This very deep, somewhat poorly drained soil is on marine terraces. It formed in alluvium derived from mixed rock sources. The vegetation is mainly perennial grasses and forbs. Elevation ranges from 80 to 900 feet. The average annual precipitation is 35 to 45 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 250 to 330 days.

Typically, the surface layer is brown loam about 16 inches thick. The upper part of the subsoil is light yellowish brown clay loam about 8 inches thick. The next 19 inches is very pale brown gravelly clay loam that has brownish yellow mottles. The lower 18 inches of the subsoil is white clay loam that has brownish yellow mottles.

Included with this soil in mapping are small areas of Flumeville, Mallopass, and Biaggi soils. Also included are small areas that have slopes of more than 5 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is moderately slow in the Windyhollow soil. Available water capacity is high. The soil is saturated with water for brief or long periods following episodes of heavy rain from December through April. The saturated zone starts between the depths of 30 and 48 inches and extends to a depth of more than 60 inches. The saturated soil conditions limit the rooting depth of many plant species. The soil is not saturated above a depth of 60 inches from early summer through fall. Surface runoff is very slow or slow, and the hazard of water erosion is slight if the surface is left bare.

This unit is used for livestock grazing, hay and pasture, homesite development, or wildlife habitat.

In areas used as rangeland or for livestock grazing, the characteristic plant community is mainly California oatgrass, hairy oatgrass, and common velvetgrass. Soil properties generally do not limit range management practices.

Few limitations affect the use of this unit for hay and pasture. The seasonally saturated soil conditions reduce the amount of irrigation water needed.

The main limitations affecting homesite development are the seasonally saturated soil conditions and the moderately slow permeability in the subsoil. Surface drainage is needed for roads and buildings. The saturated soil conditions and the restricted permeability in the subsoil increase the possibility of failure of septic tank absorption fields. Special systems or installation methods may be needed. These include systems in which the leach lines are established in a mound above the soil surface.

Windbreaks may be desirable on this unit to protect buildings, livestock, and fields from prevailing winds. The main limitation affecting the establishment of windbreaks is the seasonal wetness. Trees and shrubs that are tolerant of saturated soil conditions should be planted. Trees that are suitable for planting include eucalyptus and bishop pine.

The capability classification is IIw-2(4), irrigated, and IIIw-2(4), nonirrigated.

226—Windyhollow loam, 5 to 15 percent slopes

This very deep, somewhat poorly drained soil is on marine terraces. It formed in alluvium derived from mixed rock sources. The vegetation is mainly perennial grasses and forbs. Elevation ranges from 80 to 900 feet. The average annual precipitation is 35 to 45 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 250 to 330 days.

Typically, the surface layer is brown loam about 16 inches thick. The upper part of the subsoil is light yellowish brown clay loam about 8 inches thick. The next 19 inches is very pale brown gravelly clay loam that has brownish yellow mottles. The lower 18 inches of the subsoil is white clay loam that has brownish yellow mottles.

Included with this soil in mapping are small areas of Flumeville, Mallopass, and Biaggi soils. Also included are small areas that have slopes of less than 5 percent or more than 15 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is moderately slow in the Windyhollow soil. Available water capacity is high. The soil is saturated with water for brief or long periods following episodes of heavy rain from December through April. The saturated zone starts between the depths of 30 and 48 inches and extends to a depth of more than 60 inches. The saturated soil conditions limit the rooting depth of many plant species. The soil is not saturated above a depth of 60 inches from early summer through fall. Surface runoff is medium, and the hazard of water erosion is moderate if the surface is left bare.

This unit is used for livestock grazing, hay and pasture, homesite development, or wildlife habitat.

In areas that are used as rangeland or for

livestock grazing, the characteristic plant community is mainly California oatgrass, hairy oatgrass, and common velvetgrass. Soil properties generally do not limit range management practices.

If this unit is used for hay and pasture, the main limitation is the hazard of erosion. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and protect the soil from erosion. Seedbed preparation should be on the contour or across the slope where practical. The seasonally saturated soil conditions reduce the amount of irrigation water needed.

The main limitations affecting homesite development are the slope, the seasonally saturated soil conditions, and the moderately slow permeability in the subsoil. Excavations for roads and buildings increase the hazard of erosion. Revegetating disturbed areas around construction sites as soon as possible helps to control erosion. The design of access roads should control surface runoff and help to stabilize cut slopes. Surface drainage is needed for roads and buildings. The saturated soil conditions and the restricted permeability in the subsoil increase the possibility of failure of septic tank absorption fields. Special systems or installation methods may be needed. These may include systems in which the leach lines are established in a mound above the soil surface.

Windbreaks may be desirable on this unit to protect buildings, livestock, and fields from prevailing winds. The main limitation affecting the establishment of windbreaks is the seasonal wetness. Trees and shrubs that are tolerant of saturated soil conditions should be planted. Trees that are suitable for planting include eucalyptus and bishop pine.

The capability classification is IIIw-1(4), irrigated and nonirrigated.

227—Windyhollow loam, 15 to 30 percent slopes

This very deep, somewhat poorly drained soil is on marine terraces. It formed in alluvium derived from mixed rock sources. The vegetation is mainly perennial grasses and forbs. Elevation ranges from 80 to 900 feet. The average annual precipitation is 35 to 45 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 250 to 330 days.

Typically, the surface layer is brown loam about 16 inches thick. The upper part of the subsoil is light yellowish brown clay loam about 8 inches thick. The next 19 inches is very pale brown gravelly clay loam that has brownish yellow mottles. The lower 18 inches of the subsoil is white clay loam that has brownish yellow mottles.

Included with this soil in mapping are small areas of Mallopass and Bruhel soils. Also included are small areas that have slopes of less than 15 percent or more than 30 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability is moderately slow in the Windyhollow soil. Available water capacity is high. The soil is saturated with water for brief or long periods following episodes of heavy rain from December through April. The saturated zone starts between the depths of 30 and 48 inches and extends to a depth of more than 60 inches. The saturated soil conditions limit the rooting depth of many plant species. The soil is not saturated above a depth of 60 inches from early summer through fall. Surface runoff is rapid, and the hazard of water erosion is moderate if the surface is left bare.

This unit is used for livestock grazing, hay and pasture, or wildlife habitat.

In areas that are used as rangeland or for livestock grazing, the characteristic plant community is mainly California oatgrass, hairy oatgrass, and common velvetgrass. Soil properties generally do not limit range management practices.

If this unit is used for hay and pasture, the main limitations are the slope and the hazard of erosion. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and protect the soil from erosion. Seedbed preparation should be on the contour or across the slope where practical. The seasonally saturated soil conditions reduce the amount of irrigation water needed.

The capability classification is IVe-1(4), irrigated and nonirrigated.

228—Witherell-Hopland-Squawrock complex, 50 to 75 percent slopes

This map unit is on hills and mountains. The vegetation is mainly annual grasses and forbs on the Witherell and Squawrock soils and hardwoods on the Hopland soil. Elevation ranges from 500 to 2,500 feet. The average annual precipitation is 45 to 60 inches, the average annual air temperature is about 57 degrees F, and the average frost-free period is 150 to 250 days.

This unit is about 40 percent Witherell loam, 20 percent Hopland loam, and 20 percent Squawrock gravelly loam. The three soils occur as areas so

intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Maymen, Yorkville, and Bearwallow soils and areas of Rock outcrop. Also included are small areas that have slopes of 30 to 50 percent or 75 to 99 percent. Included areas make up about 20 percent of the total acreage of the unit. The percentage varies from one area to another.

The Witherell soil is shallow to bedrock and is somewhat excessively drained. It formed in material derived from sandstone. Typically, the surface layer is brown loam about 1 inch thick. The subsoil is light yellowish brown loam about 11 inches thick. Hard, fractured sandstone is at a depth of about 12 inches. In some areas the surface layer is gravelly loam.

Permeability is moderate in the Witherell soil. Available water capacity is very low. The effective rooting depth is limited by bedrock at a depth of 10 to 20 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

The Hopland soil is moderately deep to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is yellowish brown loam about 15 inches thick. The subsoil is reddish yellow loam about 15 inches thick. Soft sandstone bedrock is at a depth of about 30 inches.

Permeability is moderately slow in the Hopland soil. Available water capacity is low. The effective rooting depth is limited by weathered bedrock at a depth of 20 to 40 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

The Squawrock soil is moderately deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface layer is pale brown gravelly loam about 7 inches thick. The upper 11 inches of the subsoil is pale brown very gravelly loam. The lower 14 inches is very pale brown very gravelly clay loam. Hard, fractured sandstone is at a depth of about 32 inches. In some areas the surface layer is loam.

Permeability is moderate in the Squawrock soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

The Witherell and Squawrock soils are used for livestock grazing, and the Hopland soil is used for limited firewood production. This unit is also used as wildlife habitat or as watershed.

The characteristic plant community on the Witherell and Squawrock soils is mainly soft chess, filaree, and wild oat. The main limitations affecting range management are the slope and the effective rooting depth. The slope limits access by livestock and results in overgrazing of the less sloping areas. Fencing, water development, and the strategic location of salt blocks can improve the distribution of livestock. The production of forage on the Witherell soil is limited by the shallow effective rooting depth. If seeding is considered, species that are tolerant of droughty conditions should be selected.

The main limitations affecting range management in areas of the Squawrock soil are the slope and the low available water capacity. The slope limits access by livestock and results in overgrazing of the less sloping areas. Fencing, water development, and the strategic location of salt blocks can improve the distribution of livestock. The production of forage on the Squawrock soil is limited by the amount of moisture available for plant growth. If seeding is considered, species that are tolerant of droughty conditions should be selected.

California black oak, Pacific madrone, and interior live oak are the main tree species on the Hopland soil. Trees of limited extent include canyon live oak. On the basis of a 50-year site curve, the mean site index is 44 for California black oak on the Hopland soil. Volumes of 30 to 35 cords per acre from a stand of trees 50 years old are common on this soil.

The main limitation affecting the harvesting of firewood is the slope. Roads may fail and landslides may occur following deep soil disturbance on this unit. Unsurfaced roads and skid trails are slippery when wet. They may be impassable during rainy periods. Rock for construction of roads is generally available in areas of this unit. Revegetation of cut and fill slopes is difficult on the Witherell and Squawrock soils because of the low available water capacity. The harvesting of trees is generally not feasible on this unit.

Among the common forest understory plants are blue wildrye, melic grass, and soft chess.

The capability classification is VIIe(15), nonirrigated.

229—Wolfey-Bearwallow complex, 30 to 50 percent slopes

This map unit is on hills and mountains. The vegetation is mainly annual grasses and forbs.

Elevation ranges from 300 to 2,500 feet. The average annual precipitation is 45 to 60 inches, the average annual air temperature is about 57 degrees F, and the average frost-free period is 150 to 250 days.

This unit is about 40 percent Wolfey loam and 40 percent Bearwallow loam. The Wolfey and Bearwallow soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Witherell, Squawrock, and Hopland soils. Also included are small areas that have slopes of 15 to 30 percent or 50 to 75 percent. Included areas make up about 20 percent of the total acreage of the unit. The percentage varies from one area to another.

The Wolfey soil is shallow to weathered bedrock and is well drained. It formed in material derived dominantly from sandstone. Typically, the surface layer is light yellowish brown loam about 3 inches thick. The subsoil also is light yellowish brown loam. It is about 12 inches thick. Soft sandstone bedrock is at a depth of about 15 inches.

Permeability is moderate in the Wolfey soil. Available water capacity is very low. The effective rooting depth is limited by weathered bedrock at a depth of 10 to 20 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

The Bearwallow soil is moderately deep to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface layer is pale brown loam about 8 inches thick. The upper 10 inches of the subsoil also is pale brown loam. The lower 16 inches is light yellowish brown and reddish yellow loam. Soft, fractured sandstone is at a depth of about 34 inches.

Permeability is moderately slow in the Bearwallow soil. Available water capacity is moderate. The effective rooting depth is limited by weathered bedrock at a depth of 20 to 40 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

This unit is used for livestock grazing or wildlife habitat.

The characteristic plant community is mainly wild oat, soft chess, and filaree. The main limitations affecting range management are the slope and the effective rooting depth of the Wolfey soil. The slope limits access by livestock and results in overgrazing of the less sloping areas. Fencing, water development, and the strategic location of salt blocks can improve the distribution of livestock. The production of forage on the Wolfey soil is limited by the shallow effective rooting depth. If seeding is considered, species that are tolerant of droughty conditions should be selected.

The capability classification is VIe(15), nonirrigated.

230—Wolfey-Bearwallow complex, 50 to 75 percent slopes

This map unit is on hills and mountains. The vegetation is mainly annual grasses and forbs. Elevation ranges from 300 to 2,500 feet. The average annual precipitation is 45 to 60 inches, the average annual air temperature is about 57 degrees F, and the average frost-free period is 150 to 250 days.

This unit is about 50 percent Wolfey loam and 30 percent Bearwallow loam. The Wolfey and Bearwallow soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Hopland, Squawrock, and Witherell soils. Also included are small areas that have slopes of 30 to 50 percent or 75 to 99 percent. Included areas make up about 20 percent of the total acreage of the unit. The percentage varies from one area to another.

The Wolfey soil is shallow to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface layer is light yellowish brown loam about 3 inches thick. The subsoil also is light yellowish brown loam. It is about 12 inches thick. Soft sandstone bedrock is at a depth of about 15 inches.

Permeability is moderate in the Wolfey soil. Available water capacity is very low. The effective rooting depth is limited by weathered bedrock at a depth of 10 to 20 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

The Bearwallow soil is moderately deep to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface layer is pale brown loam about 8 inches thick. The upper 10 inches of the subsoil also is pale brown loam. The lower 16 inches is light yellowish brown and reddish yellow loam. Soft, fractured sandstone is at a depth of about 34 inches.

Permeability is moderately slow in the Bearwallow soil. Available water capacity is moderate. The effective rooting depth is limited by weathered bedrock at a depth of 20 to 40 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

This unit is used for livestock grazing or wildlife habitat.

The characteristic plant community is mainly wild oat, soft chess, and filaree. The main limitations affecting range management are the slope and the effective rooting depth of the Wolfey soil. The slope limits access by livestock and results in overgrazing of the less sloping areas. Fencing, water development, and the strategic location of salt blocks can improve the distribution of livestock. The production of forage on the Wolfey soil is limited by the shallow effective rooting depth. If seeding is considered, species that are tolerant of droughty conditions should be selected.

The capability classification is VIIe(15), nonirrigated.

231—Woodin-Yellowhound complex, 30 to 50 percent slopes

This map unit is on hills and mountains. The vegetation is mainly Douglas-fir and tanoak on the Woodin soil and Douglas-fir and redwood on the Yellowhound soil. Elevation ranges from 600 to 2,500 feet. The average annual precipitation is 50 to 70 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 220 to 270 days.

This unit is about 50 percent Woodin extremely gravelly sandy loam and 25 percent Yellowhound gravelly loam. The Woodin and Yellowhound soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Maymen, Ornbaun, Zeni, Kibesillah, and Pardaloe soils and small areas of soils that have been altered by skid trails, landings, and roads. Also included are small areas that have slopes of 15 to 30 percent or 50 to 75 percent. Included areas make up about 25 percent of the total acreage of the unit. The percentage varies from one area to another.

The Woodin soil is moderately deep to bedrock and is well drained. It formed in material derived from sandstone. The surface layer is very dark brown extremely gravelly sandy loam about 6 inches thick. The subsoil is very pale brown extremely gravelly loam about 16 inches thick. Hard, fractured sandstone is at a depth of about 22 inches. In some areas the surface layer is very gravelly loam, very gravelly sandy loam, or extremely gravelly loam.

Permeability is moderate in the Woodin soil. Available water capacity is very low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

The Yellowhound soil is deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is pale brown and light yellowish brown gravelly loam about 15 inches thick. The subsoil is variegated light yellowish brown and pale brown extremely gravelly loam about 38 inches thick. Hard, fractured sandstone is at a depth of about 53 inches. In some areas the surface layer is gravelly sandy loam, sandy loam, or loam.

Permeability is moderate in the Yellowhound soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 40 to 60 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

This unit is used for limited timber production or as watershed.

Douglas-fir, canyon live oak, redwood, and tanoak are the main tree species on this unit. Sugar pine is common on this unit in the southern part of the survey area. Trees of limited extent include Pacific madrone. On the basis of a 100-year site curve, the mean site index is 97 for Douglas-fir on the Woodin soil. On the basis of a 100-year site curve, the mean site index is 140 for Douglas-fir and 135 for redwood on the Yellowhound soil. The potential annual production from a fully stocked stand of Douglas-fir is 245 board feet per acre on the Woodin soil and 660 board feet per acre on the Yellowhound soil. This potential production is rarely achieved, however, because of the inherent tendency of the soils to produce understocked stands. Estimates of the potential annual production for sugar pine and redwood have not been made because these species are widely scattered.

The main limitations affecting the harvesting of timber are the slope and the low volume of commercial species. Because of these limitations, harvesting of trees is generally not feasible on this unit. Wheeled and tracked equipment can be used in the more gently sloping areas, but cable yarding systems generally cause less disturbance of the soil in the steeper areas. Rock for construction of roads is generally available in areas of this unit. Revegetation of exposed subsoil is difficult on this unit; however, it generally is not needed for control of surface erosion because of the large amount of coarse fragments. Rocks and loose soil material may slide onto roads. This hazard increases the need for road maintenance.

Seedling establishment is a concern affecting the production of timber. Droughtiness in the upper 24 inches reduces the seedling survival rate, especially on south- and southwest-facing slopes. Plantings on the Woodin soil frequently fail because of the very low available water capacity. Reforestation can be accomplished by planting Douglas-fir, sugar pine, and redwood seedlings on the Yellowhound soil.

Among the common forest understory plants are canyon live oak on the Woodin soil and California huckleberry and brackenfern on the Yellowhound soil.

The capability classification is VIe(5), nonirrigated.

232—Woodin-Yellowhound complex, 50 to 75 percent slopes

This map unit is on hills and mountains. The vegetation is mainly Douglas-fir and tanoak on the Woodin soil and Douglas-fir and redwood on the Yellowhound soil. Elevation ranges from 600 to 2,500 feet. The average annual precipitation is 50 to 70 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is about 220 to 270 days.

This unit is about 60 percent Woodin extremely gravelly sandy loam and 25 percent Yellowhound gravelly loam. The Woodin and Yellowhound soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Maymen, Ornbaun, Zeni, Kibesillah, and Pardaloe soils and small areas of soils that have been altered by skid trails, landings, and roads. Also included are small areas that have slopes of 30 to 50 percent or 75 to 99 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

The Woodin soil is moderately deep to bedrock and is well drained. It formed in material derived from sandstone. The surface layer is very dark brown extremely gravelly sandy loam about 6 inches thick. The subsoil is very pale brown extremely gravelly loam about 16 inches thick. Hard, fractured sandstone is at a depth of about 22 inches. In some areas the surface layer is very gravelly loam, very gravelly sandy loam, or extremely gravelly loam.

Permeability is moderate in the Woodin soil. Available water capacity is very low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

The Yellowhound soil is deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is pale brown and light yellowish brown gravelly loam about 15 inches thick. The subsoil is light yellowish brown and pale brown extremely gravelly loam about 38 inches thick. Hard, fractured sandstone is at a depth of about 53 inches. In some areas the surface layer is gravelly sandy loam, sandy loam, or loam.

Permeability is moderate in the Yellowhound soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 40 to 60 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

This unit is used for limited timber production or as watershed.

Douglas-fir, canyon live oak, redwood, and tanoak are the main tree species on this unit. Sugar pine is common on this unit in the southern part of the survey area. Trees of limited extent include Pacific madrone. On the basis of a 100-year site curve, the mean site index is 97 for Douglas-fir on the Woodin soil. On the basis of a 100-year site curve, the mean site index is 140 for Douglas-fir and 135 for redwood on the Yellowhound soil. The potential annual production from a fully stocked stand of Douglas-fir is 245 board feet per acre on the Woodin soil and 660 board feet per acre on the Yellowhound soil. This potential production is rarely achieved, however, because of the inherent tendency of the soils to produce understocked stands. Estimates of the potential annual production for sugar pine and redwood have not been made because these species are widely scattered.

The main limitations affecting the harvesting of timber are the slope and the low volume of commercial species. Because of these limitations, harvesting of trees is generally not feasible on this unit. The slope limits the use of wheeled and tracked equipment in skidding operations. Cable yarding systems generally cause less disturbance of the soil. Rock for construction of roads is available in areas of this unit. Revegetation of exposed subsoil is difficult on these soils; however, it generally is not needed for control of surface erosion because of the large amount of coarse fragments. Roads may fail and landslides may occur following deep soil disturbance. Rocks and loose soil material may slide onto roads. This hazard increases the need for road maintenance.

Seedling establishment is a concern affecting the

production of timber. The droughtiness of the upper 24 inches reduces the seedling survival rate, especially on south- and southwest-facing slopes. Movement of loose surface material can also reduce the seedling survival rate. Plantings on the Woodin soil frequently fail because of the very low available water capacity. Reforestation can be accomplished by planting Douglas-fir, sugar pine, and redwood seedlings on the Yellowhound soil.

Among the common forest understory plants are canyon live oak on the Woodin soil and California huckleberry and brackenfern on the Yellowhound soil.

The capability classification is VIIe(5), nonirrigated.

233—Xerochrepts-Haploxeralfs-Argixerolls complex, 9 to 30 percent slopes

This map unit is on dissected river terraces and terrace escarpments. The vegetation is mainly scattered oaks, ponderosa pine, Douglas-fir, and manzanita. Elevation ranges from 1,600 to 2,200 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is about 55 degrees F, and the average frost-free period is 150 to 250 days.

This unit is about 30 percent Xerochrepts, 30 percent Haploxeralfs, and 20 percent Argixerolls. These soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Feliz, Cole, Talmage, and Yorkville soils. Also included are small areas that have slopes of 5 to 9 percent or 30 to 50 percent. Included areas make up about 20 percent of the total acreage of the unit. The percentage varies from one area to another.

Xerochrepts are very deep and are well drained. They formed in alluvium derived from mixed rock sources. In a representative profile, the surface is covered with a mat of slightly decomposed needles and twigs about 1/2 inch thick. The surface layer is yellowish brown gravelly loam about 8 inches thick. The upper 17 inches of the subsoil is brownish yellow gravelly loam. The lower 10 inches is light yellowish brown very gravelly loam. The substratum to a depth of 61 inches or more is light yellowish brown very gravelly loam and very gravelly sandy loam. In some areas the surface layer is loam.

Permeability ranges from moderately rapid to moderately slow in the Xerochrepts. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Surface runoff is medium or rapid, and the hazard of water erosion is moderate if the surface is left bare.

Haploxeralfs are very deep and are well drained. They formed in alluvium derived from mixed rock sources. A representative profile has a surface layer of light yellowish brown loam about 20 inches thick. The upper part of the subsoil is light yellowish brown clay loam about 30 inches thick. The lower part to a depth of 62 inches or more is very pale brown sandy clay loam. In some areas the surface layer is gravelly loam or sandy loam.

Permeability ranges from moderately rapid to moderately slow in the Haploxeralfs. Available water capacity is very high. The effective rooting depth is 60 inches or more. Surface runoff is medium or rapid, and the hazard of water erosion is moderate if the surface is left bare.

The Argixerolls are very deep and are well drained. They formed in alluvium derived from mixed rock sources. In a representative profile, the surface is covered with a mat of litter about 1 inch thick. The surface layer is brown loam about 10 inches thick. The upper 6 inches of the subsoil is yellowish brown loam. The lower 46 inches is light yellowish brown and yellowish brown clay loam. In some areas the surface layer is gravelly loam.

Permeability ranges from moderately rapid to moderately slow in the Argixerolls. Available water capacity is high. The effective rooting depth is 60 inches or more. Surface runoff is medium or rapid, and the hazard of water erosion is moderate if the surface is left bare.

This unit is used for limited timber production, firewood production, or homesite development.

Ponderosa pine, Douglas-fir, and California black oak are the main tree species on this unit. On the basis of a 100-year site curve, the site index for ponderosa pine ranges from 101 to 134 on the Xerochrepts and Haploxeralfs and from 98 to 133 on the Argixerolls. On the basis of a 100-year site curve, the site index for Douglas-fir ranges from 85 to 141 on the Xerochrepts and Haploxeralfs and from 97 to 131 on the Argixerolls. Site index varies with the amount of coarse fragments in any given soil profile.

The main limitation affecting the harvesting of timber and firewood is seasonal wetness. Using wheeled and tracked equipment when the soils are wet produces ruts, compacts the surface, and can damage the roots of trees. Disturbance of the protective layer of duff can be minimized by the careful use of either wheeled or tracked equipment. Roads on this unit are dusty when dry. Surface treatment may be desirable during periods of heavy

use. Unsurfaced roads and skid trails are soft when wet, and they may be impassable during rainy periods. Suitable surfacing of roads is needed for use during wet seasons. Rock for construction of roads is not readily available in areas of this unit.

Seedling establishment and plant competition are concerns affecting the production of timber. The high soil temperature and low content of soil moisture during the growing season result in a high mortality rate for Douglas-fir seedlings, especially on south- and southwest-facing slopes. Carefully managing reforestation helps to control competition from undesirable plants and provides partial shade for seedlings. Reforestation can be accomplished by planting ponderosa pine or Douglas-fir seedlings. If seed trees are present, natural reforestation of cutover areas by ponderosa pine frequently occurs. Natural Douglas-fir seedlings generally do not survive. When openings are made in the canopy, invading brushy plants that are not controlled can prevent the establishment of seedlings.

Among the common forest understory plants are manzanita, red fescue, poison oak, and bedstraw.

The main limitations affecting homesite development are the slope and the moderately slow permeability in some areas. The most favorable building sites are on knolls and in the less sloping areas. Excavation for roads and buildings increases the hazard of erosion. The design of access roads should control surface runoff and help to stabilize cut slopes. The restricted permeability increases the possibility of failure of septic tank absorption fields. Alternative systems may be needed. Enlarging the absorption fields and installing systems that use low-volume flush toilets can help to overcome the restricted permeability. The slope is a concern affecting the installation of septic tank absorption fields. Absorption lines should be installed on the contour.

The capability classification is IVe-1(5), nonirrigated.

234—Xerochrepts-Haploxeralfs-Argixerolls complex, 30 to 50 percent slopes

This map unit is on dissected river terraces and terrace escarpments. The vegetation is mainly scattered oaks, ponderosa pine, Douglas-fir, and manzanita. Elevation ranges from 1,600 to 2,200 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is about 55 degrees F, and the average frost-free period is 150 to 250 days.

This unit is about 30 percent Xerochrepts, 30 percent Haploxeralfs, and 20 percent Argixerolls. These soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Yorktree soils. Also included are small areas that have slopes of 15 to 30 percent or 50 to 75 percent. Included areas make up about 20 percent of the total acreage of the unit. The percentage varies from one area to another.

Xerochrepts are very deep and are well drained. They formed in alluvium derived from mixed rock sources. In a representative profile, the surface is covered with a mat of slightly decomposed needles and twigs about 1/2 inch thick. The surface layer is yellowish brown gravelly loam about 8 inches thick. The upper 17 inches of the subsoil is brownish yellow gravelly loam. The lower 10 inches is light yellowish brown very gravelly loam. The substratum to a depth of 61 inches or more is light yellowish brown very gravelly loam and very gravelly sandy loam. In some areas the surface layer is loam.

Permeability ranges from moderately rapid to moderately slow in the Xerochrepts. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

Haploxeralfs are very deep and are well drained. They formed in alluvium derived from mixed rock sources. A representative profile has a surface layer of light yellowish brown loam about 20 inches thick. The upper part of the subsoil is light yellowish brown clay loam about 30 inches thick. The lower part to a depth of 62 inches or more is very pale brown sandy clay loam. In some areas the surface layer is gravelly loam or sandy loam.

Permeability ranges from moderately rapid to moderately slow in the Haploxeralfs. Available water capacity is very high. The effective rooting depth is 60 inches or more. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

Argixerolls are very deep and are well drained. They formed in alluvium derived from mixed rock sources. In a representative profile, the surface is covered with a mat of litter about 1 inch thick. The surface layer is brown loam about 10 inches thick. The upper 6 inches of the subsoil is yellowish brown loam. The lower 46 inches is light yellowish brown clay loam. In some areas the surface layer is gravelly loam.

Permeability ranges from moderately rapid to

moderately slow in the Argixerolls. Available water capacity is high. The effective rooting depth is 60 inches or more. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

This unit is used for timber production, firewood production, wildlife habitat, or watershed.

Ponderosa pine, Douglas-fir, and California black oak are the main tree species on this unit. On the basis of a 100-year site curve, the site index for ponderosa pine ranges from 101 to 134 on the Xerochrepts and Haploxeralfs and from 98 to 133 on the Argixerolls. On the basis of a 100-year site curve, the site index for Douglas-fir ranges from 85 to 141 on the Xerochrepts and Haploxeralfs and from 97 to 131 on the Argixerolls. Site index varies with the amount of coarse fragments in the profile.

The main limitations affecting the harvesting of timber and firewood are the slope, the hazard of erosion, and seasonal wetness. Wheeled and tracked equipment can be used in the more gently sloping areas, but cable yarding systems generally cause less disturbance of the soil in the steeper areas. Disturbance of the protective layer of duff can be minimized by the careful use of either wheeled and tracked equipment or cable yarding systems. Unless adequate plant cover or water bars are provided, steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying. Gullies form readily when water is concentrated in unprotected ditches. Establishing plant cover on steep cut and fill slopes reduces the hazard of surface erosion. Using wheeled and tracked equipment when the soils are wet produces ruts, compacts the surface, and can damage the roots of trees. Roads on this unit are dusty when dry. Surface treatment may be desirable during periods of heavy use. Unsurfaced roads and skid trails are slippery when wet. They may be impassable during rainy periods. Suitable surfacing of roads is needed for use during wet seasons. Rock for construction of roads generally is not readily available in areas of this unit.

Seedling establishment and plant competition are concerns affecting the production of timber and firewood on this unit. The high soil temperature and low content of soil moisture during the growing season result in a high seedling mortality rate, especially on south- and southwest-facing slopes. Carefully managing reforestation helps to control competition from undesirable plants and provides partial shade for seedlings. Reforestation can be accomplished by planting ponderosa pine or Douglas-fir seedlings. If seed trees are present, natural reforestation of cutover areas by ponderosa pine frequently occurs. Natural Douglas-fir seedlings generally do not survive. When openings are made in the canopy, invading brushy plants that are not controlled can prevent the establishment of seedlings.

Among the common forest understory plants are manzanita, red fescue, poison oak, and bedstraw.

The capability classification is VIe(5), nonirrigated.

235—Yellowhound-Kibesillah complex, 50 to 75 percent slopes

This map unit is on hills and mountains. The vegetation is mainly Douglas-fir, redwood, and tanoak. Elevation ranges from 200 to 2,000 feet. The average annual precipitation is 50 to 70 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 220 to 320 days.

This unit is about 45 percent Yellowhound gravelly loam and 35 percent Kibesillah very gravelly loam. The Yellowhound and Kibesillah soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Ornbaun and Zeni soils and small areas of soils that have been drastically altered by logging activities. Also included are small areas that have slopes of 30 to 50 percent or 75 to 99 percent. Included areas make up about 20 percent of the total acreage of the unit. The percentage varies from one area to another.

The Yellowhound soil is deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is pale brown, very pale brown, and light yellowish brown gravelly loam about 15 inches thick. The subsoil is light yellowish brown, very pale brown, yellowish brown, and pale brown extremely gravelly loam about 38 inches thick. Hard, fractured sandstone is at a depth of about 53 inches. In some areas the surface layer is gravelly sandy loam, sandy loam, or loam.

Permeability is moderate in the Yellowhound soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 40 to 60 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

The Kibesillah soil is moderately deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a

mat of leaves and twigs about 1/2 inch thick. The surface layer is pale brown very gravelly loam about 13 inches thick. The upper 6 inches of the subsoil is very pale brown very gravelly loam. The lower 7 inches is very pale brown extremely gravelly clay loam. Hard, fractured sandstone is at a depth of about 26 inches. In some areas the surface layer is gravelly loam.

Permeability is moderate in the Kibesillah soil. Available water capacity is very low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

This unit is used for timber production or as watershed.

Douglas-fir, redwood, and tanoak are the main tree species on this unit. Sugar pine commonly occurs on this unit in the southern part of the survey area. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 140 on the Yellowhound soil and 109 on the Kibesillah soil. The potential annual production from a fully stocked stand of Douglas-fir is 630 board feet per acre on the Yellowhound soil and 335 board feet per acre on the Kibesillah soil. On the basis of a 100-year site curve, the mean site index for redwood is 135 on the Yellowhound soil and 109 on the Kibesillah soil. Trees of limited extent include Pacific madrone and canyon live oak.

The main limitations affecting the harvesting of timber are the slope and the hazard of erosion. When timber is harvested, the slope limits the use of wheeled and tracked equipment in skidding operations. Cable yarding systems generally cause less disturbance of the soil. Revegetation of exposed subsoil is difficult on these soils; however, it generally is not needed for control of surface erosion because of the large amount of coarse fragments. Roads may fail and landslides may occur following deep soil disturbance in the steeper areas. Rock for construction of roads generally is available in areas of this unit. Rocks and loose soil material may slide onto roads. This hazard increases the need for road maintenance.

Seedling establishment and plant competition are concerns affecting the production of timber. The droughtiness of the upper 24 inches reduces the seedling survival rate, especially on south- and southwest-facing slopes. Movement of loose surface material can also reduce the seedling survival rate. Reforestation can be accomplished by planting Douglas-fir and redwood seedlings on the Yellowhound soil and planting Douglas-fir seedlings on the Kibesillah soil. If seed trees are present, natural reforestation of cutover areas by Douglas-fir occurs infrequently. Redwood can regenerate by sprouting after cutting. These sprouts seldom provide optimum stocking. When openings are made in the canopy, invading brushy plants that are not controlled can prevent the establishment of seedlings.

Among the common forest understory plants are buckbrush, blueblossom ceanothus, tanoak, and California huckleberry. Canyon live oak occurs primarily on south-facing slopes.

The capability classification is VIIe(4), nonirrigated.

236—Yellowhound-Kibesillah-Ornbaun complex, 9 to 30 percent slopes

This map unit is on hills and mountains. The vegetation is mainly Douglas-fir, redwood, and tanoak. Elevation ranges from 200 to 2,000 feet. The average annual precipitation is 50 to 70 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 220 to 320 days.

This unit is about 40 percent Yellowhound loam, 25 percent Kibesillah very gravelly loam, and 20 percent Ornbaun loam. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Zeni soils and soils that have been altered by skid trails, landings, and roads. Also included are small areas that have slopes of 5 to 9 percent or 30 to 50 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

The Yellowhound soil is deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is pale brown and light yellowish brown loam about 15 inches thick. The upper 13 inches of the subsoil is light yellowish brown and very pale brown very gravelly loam. The lower 25 inches is variegated yellowish brown and pale brown extremely gravelly loam. Hard, fractured sandstone is at a depth of about 53 inches. In some areas the surface layer is gravelly sandy loam, sandy loam, or gravelly loam.

Permeability is moderate in the Yellowhound soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 40 to 60 inches. Surface runoff is medium or rapid, and the hazard of water erosion is moderate if the surface is left bare.

The Kibesillah soil is moderately deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1/2 inch thick. The surface layer is pale brown very gravelly loam about 13 inches thick. The upper 6 inches of the subsoil is very pale brown very gravelly loam. The lower 7 inches is very pale brown extremely gravelly clay loam. Hard, fractured sandstone is at a depth of about 26 inches. In some areas the surface layer is gravelly loam.

Permeability is moderate in the Kibesillah soil. Available water capacity is very low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is medium or rapid, and the hazard of water erosion is moderate if the surface is left bare.

The Ornbaun soil is deep to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1/2 inch thick. The surface layer is light yellowish brown loam about 3 inches thick. The upper 37 inches of the subsoil is light brown and reddish yellow loam. The lower 19 inches is reddish yellow and pink clay loam. Soft, fractured sandstone is at a depth of about 59 inches.

Permeability is moderate in the Ornbaun soil. Available water capacity is high. The effective rooting depth is limited by weathered bedrock at a depth of 40 to 60 inches. Surface runoff is medium or rapid, and the hazard of water erosion is moderate if the surface is left bare.

This unit is used for timber production or as watershed.

Douglas-fir, redwood, and tanoak are the main tree species on this unit. Sugar pine commonly occurs on this unit in the southern part of the survey area. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 140 on the Yellowhound soil, 109 on the Kibesillah soil, and 155 on the Ornbaun soil. The potential annual production from a fully stocked stand of Douglas-fir is 630 board feet per acre on the Yellowhound soil, 335 board feet per acre on the Kibesillah soil, and 770 board feet per acre on the Ornbaun soil. On the basis of a 100-year site curve, the mean site index for redwood is 135 on the Yellowhound soil, 109 on the Kibesillah soil, and 152 on the Ornbaun soil. Trees of limited extent include Pacific madrone and canyon live oak.

The main limitation affecting timber harvesting is seasonal wetness. Using wheeled and tracked equipment when the soils are wet produces ruts, compacts the surface, and can damage the roots of trees, primarily in areas of the Ornbaun soil. Disturbance of the protective layer of duff can be minimized by the careful use of wheeled and tracked equipment. Revegetation of exposed subsoil is difficult on the Yellowhound and Kibesillah soils; however, it generally is not needed for control of surface erosion because of the large amount of coarse fragments. Establishing plant cover on steep cut and fill slopes reduces the hazard of surface erosion on the Ornbaun soil. Rock for construction of roads generally is available in areas of this unit.

Seedling establishment and plant competition are concerns affecting the production of timber. The droughtiness of the upper 24 inches reduces the seedling survival rate, especially on south- and southwest-facing slopes. Reforestation can be accomplished by planting Douglas-fir and redwood seedlings on the Yellowhound and Ornbaun soils and planting Douglas-fir seedlings on the Kibesillah soil. If seed trees are present, natural reforestation of cutover areas by Douglas-fir occurs infrequently. Redwood can regenerate by sprouting after cutting. These sprouts seldom provide optimum stocking. When openings are made in the canopy, invading brushy plants that are not controlled can prevent the establishment of seedlings.

Among the common forest understory plants are California huckleberry, brackenfern, tanoak, and blueblossom ceanothus.

The capability classification is IVe-1(4), nonirrigated.

237—Yellowhound-Kibesillah-Ornbaun complex, 30 to 50 percent slopes

This map unit is on hills and mountains. The vegetation is mainly Douglas-fir, redwood, and tanoak. Elevation ranges from 200 to 2,000 feet. The average annual precipitation is 50 to 70 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 220 to 320 days.

This unit is about 40 percent Yellowhound gravelly loam, 30 percent Kibesillah very gravelly loam, and 15 percent Ornbaun loam. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Zeni soils and soils that have been altered by skid trails, landings, and roads. Also included are small areas that have slopes of 15 to 30 percent or 50 to 75 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

The Yellowhound soil is deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is pale brown and light yellowish brown gravelly loam about 15 inches thick. The subsoil is light yellowish brown and pale brown extremely gravelly loam about 38 inches thick. Hard, fractured sandstone is at a depth of about 53 inches. In some areas the surface layer is gravelly sandy loam, sandy loam, or loam.

Permeability is moderate in the Yellowhound soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 40 to 60 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

The Kibesillah soil is moderately deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1/2 inch thick. The surface layer is pale brown very gravelly loam about 13 inches thick. The upper 6 inches of the subsoil is very pale brown very gravelly loam. The lower 7 inches is very pale brown extremely gravelly clay loam. Hard, fractured sandstone is at a depth of about 26 inches. In some areas the surface layer is gravelly loam.

Permeability is moderate in the Kibesillah soil. Available water capacity is very low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

The Ornbaun soil is deep to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1/2 inch thick. The surface layer is light yellowish brown loam about 3 inches thick. The upper 37 inches of the subsoil is light brown and reddish yellow loam. The lower 19 inches is reddish yellow and pink clay loam. Soft, fractured sandstone is at a depth of about 59 inches.

Permeability is moderate in the Ornbaun soil. Available water capacity is high. The effective rooting depth is limited by weathered bedrock at a depth of 40 to 60 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

This unit is used for timber production or as watershed.

Douglas-fir, redwood, and tanoak are the main tree species on this unit. Sugar pine commonly occurs on this unit in the southern part of the survey area. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 140 on the Yellowhound soil, 109 on the Kibesillah soil, and 155 on the Ornbaun soil. The potential annual production from a fully stocked stand of Douglas-fir is 630 board feet per acre on the Yellowhound soil, 335 board feet per acre on the Kibesillah soil, and 770 board feet per acre on the Ornbaun soil. On the basis of a 100-year site curve, the mean site index for redwood is 135 on the Yellowhound soil, 109 on the Kibesillah soil, and 152 on the Ornbaun soil. Trees of limited extent include Pacific madrone and canyon live oak.

The main limitations affecting the harvesting of timber are the slope, the hazard of erosion, and seasonal wetness. Wheeled and tracked equipment can be used in the more gently sloping areas, but cable yarding systems generally cause less disturbance of the soil in the steeper areas. Disturbance of the protective layer of duff can be minimized by the careful use of either wheeled and tracked equipment or cable yarding systems. Unless adequate plant cover or water bars are provided, steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying. Revegetation of exposed subsoil is difficult on the Yellowhound and Kibesillah soils; however, it generally is not needed for control of surface erosion because of the large amount of coarse fragments. Establishing plant cover on steep cut and fill slopes reduces the hazard of surface erosion on the Ornbaun soil. Using wheeled and tracked equipment when the soils are wet produces ruts, compacts the surface, and can damage the roots of trees on the Yellowhound and Ornbaun soils. Rock for construction of roads generally is available in areas of this unit.

Seedling establishment and plant competition are concerns affecting the production of timber. The droughtiness of the upper 24 inches reduces the seedling survival rate, especially on south- and southwest-facing slopes. Reforestation can be accomplished by planting Douglas-fir and redwood seedlings on the Yellowhound and Ornbaun soils and planting Douglas-fir seedlings on the Kibesillah soil. If seed trees are present, natural reforestation of cutover areas by Douglas-fir occurs infrequently. Redwood can regenerate by sprouting after cutting. These sprouts seldom provide optimum stocking. When openings are made in the canopy, invading brushy plants that are not controlled can prevent the establishment of seedlings.

Among the common forest understory plants are California huckleberry, brackenfern, tanoak, buckbrush, and blueblossom ceanothus.

The capability classification is VIe(4), nonirrigated.

238—Yellowhound-Woodin complex, 50 to 75 percent slopes

This map unit is on hills and mountains. The vegetation is mainly Douglas-fir and redwood on the Yellowhound soil and Douglas-fir and tanoak on the Woodin soil. Elevation ranges from 600 to 2,500 feet. The average annual precipitation is 50 to 70 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 220 to 270 days.

This unit is about 50 percent Yellowhound gravelly loam and 25 percent Woodin extremely gravelly sandy loam. The Yellowhound and Woodin soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Maymen, Ornbaun, Zeni, Kibesillah, and Pardaloe soils and small areas of soils that have been altered by skid trails, landings, and roads. Also included are small areas that have slopes of 30 to 50 percent or 75 to 99 percent. Included areas make up about 25 percent of the total acreage of the unit. The percentage varies from one area to another.

The Yellowhound soil is deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is pale brown and light yellowish brown gravelly loam about 15 inches thick. The subsoil is light yellowish brown and pale brown extremely gravelly loam about 38 inches thick. Hard, fractured sandstone is at a depth of about 53 inches. In some areas the surface layer is gravelly sandy loam or loam.

Permeability is moderate in the Yellowhound soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 40 to 60 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

The Woodin soil is moderately deep to bedrock and is well drained. It formed in material derived from sandstone. The surface layer is very dark brown extremely gravelly sandy loam about 6 inches thick. The subsoil is very pale brown extremely gravelly loam about 16 inches thick. Hard, fractured sandstone is at a depth of about 22 inches. In some areas the surface layer is very gravelly loam, very gravelly sandy loam, or extremely gravelly loam.

Permeability is moderate in the Woodin soil. Available water capacity is very low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is very rapid, and the hazard of water erosion is very severe if the surface is left bare.

This unit is used for timber production or as watershed.

Douglas-fir, tanoak, and redwood are the main tree species on the Yellowhound soil. On the basis of a 100-year site curve, the mean site index is 140 for Douglas-fir and 135 for redwood. The potential annual production from a fully stocked stand of Douglas-fir is 630 board feet per acre on the Yellowhound soil. Trees of limited extent include Pacific madrone and canyon live oak.

Tanoak, canyon live oak, and Douglas-fir are the main tree species on the Woodin soil. On the basis of a 100-year site curve, the mean site index is 97 for Douglas-fir. The potential annual production from a fully stocked stand of Douglas-fir is 245 board feet per acre on the Woodin soil. This potential production is rarely achieved, however, because of the inherent tendency of this soil to produce understocked stands. Trees of limited extent include Pacific madrone.

The main limitations affecting the harvesting of timber are the slope and the hazard of erosion. When timber is harvested, the slope limits the use of wheeled and tracked equipment in skidding operations. Cable yarding systems generally cause less disturbance of the soil. Revegetation of exposed subsoil is difficult on these soils; however, it generally is not needed for control of surface erosion because of the large amount of coarse fragments. Roads may fail and landslides may occur following deep soil disturbance in the steeper areas. Rock for construction of roads generally is available in areas of this unit. Rocks and loose soil material may slide onto roads. This hazard increases the need for road maintenance.

Seedling establishment is a concern affecting the production of timber. The droughtiness of the upper 24 inches reduces the seedling survival rate, especially on south- and southwest-facing slopes. Movement of loose surface material can also reduce the seedling survival rate. Reforestation can be accomplished by planting Douglas-fir and redwood seedlings on the Yellowhound soil. Plantings on the Woodin soil frequently fail because of the very low available water capacity.

Among the common forest understory plants are California huckleberry and brackenfern on the Yellowhound soil and hairy manzanita and canyon live oak on the Woodin soil.

The capability classification is VIIe(4), nonirrigated.

239—Yellowhound-Woodin-Ornbaun complex, 9 to 30 percent slopes

This map unit is on hills and mountains. The vegetation is mainly Douglas-fir and redwood on the Yellowhound and Ornbaun soils and Douglas-fir and tanoak on the Woodin soils. Elevation ranges from 600 to 2,500 feet. The average annual precipitation is 50 to 70 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 220 to 270 days.

This unit is about 40 percent Yellowhound loam, 30 percent Woodin gravelly sandy loam, and 15 percent Ornbaun loam. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Maymen, Zeni, Kibesillah, and Pardaloe soils and small areas of soils that have been altered by skid trails, landings, and roads. Also included are small areas that have slopes of 30 to 50 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

The Yellowhound soil is deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is pale brown and light yellowish brown loam about 15 inches thick. The upper 13 inches of the subsoil is light yellowish brown and very pale brown very gravelly loam. The lower 25 inches is yellowish brown and pale brown extremely gravelly loam. Hard, fractured sandstone is at a depth of about 53 inches. In some areas the surface layer is gravelly sandy loam or sandy loam.

Permeability is moderate in the Yellowhound soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 40 to 60 inches. Surface runoff is medium or rapid, and the hazard of water erosion is moderate if the surface is left bare.

The Woodin soil is moderately deep to bedrock and is well drained. It formed in material derived from sandstone. The surface layer is very dark brown gravelly sandy loam about 6 inches thick. The subsoil is very pale brown extremely gravelly loam about 16 inches thick. Hard, fractured sandstone is at a depth of about 22 inches. In some areas the surface layer is very gravelly loam, very gravelly sandy loam, or extremely gravelly loam.

Permeability is moderate in the Woodin soil. Available water capacity is very low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is medium or rapid, and the hazard of water erosion is moderate if the surface is left bare.

The Ornbaun soil is deep to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about $^{1}/_{2}$ inch thick. The surface layer is light yellowish brown loam about 3 inches thick. The upper 37 inches of the subsoil is light brown and reddish yellow loam. The lower 19 inches is reddish yellow and pink clay loam. Soft, fractured sandstone is at a depth of about 59 inches.

Permeability is moderate in the Ornbaun soil. Available water capacity is high. The effective rooting depth is limited by weathered bedrock at a depth of 40 to 60 inches. Surface runoff is medium or rapid, and the hazard of water erosion is moderate if the surface is left bare.

This unit is used for timber production or as watershed.

Douglas-fir, tanoak, and redwood are the main tree species on the Yellowhound and Ornbaun soils. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 140 on the Yellowhound soil and 155 on the Ornbaun soil. The potential annual production from a fully stocked stand of Douglas-fir is 630 board feet per acre on the Yellowhound soil and 770 board feet per acre on the Ornbaun soil. On the basis of a 100-year site curve, the mean site index for redwood is 135 on the Yellowhound soil and 152 on the Ornbaun soil. Trees of limited extent include Pacific madrone and canyon live oak.

Tanoak, canyon live oak, and Douglas-fir are the main tree species on the Woodin soil. On the basis of a 100-year site curve, the mean site index is 97 for Douglas-fir. The potential annual production from a fully stocked stand of Douglas-fir is 245 board feet per acre on the Woodin soil. This potential production is rarely achieved, however, because of the inherent tendency of this soil to produce understocked stands. Trees of limited extent include Pacific madrone.

Few limitations affect the harvesting of timber. Revegetation of exposed subsoil is difficult on the Yellowhound and Woodin soils; however, it generally is not needed for control of surface erosion because of the large amount of coarse fragments. Establishing plant cover on steep cut and fill slopes reduces the hazard of surface erosion on the Ornbaun soil. Rock for construction of roads generally is available in areas of this unit.

Seedling establishment is a concern affecting the production of timber on the Yellowhound and Woodin soils. Droughtiness in the upper 24 inches reduces the seedling survival rate, especially on south- and

southwest-facing slopes. Plant competition is also a concern. When openings are made in the canopy, invading brushy plants that are not controlled can prevent the establishment of seedlings. Reforestation can be accomplished by planting Douglas-fir and redwood seedlings on the Yellowhound and Ornbaun soils. If seed trees are present, natural reforestation of cutover areas by Douglas-fir occurs infrequently. Plantings on the Woodin soil frequently fail because of the very low available water capacity.

Among the common forest understory plants are California huckleberry and brackenfern on the Yellowhound and Ornbaun soils and hairy manzanita and canyon live oak on the Woodin soil.

The capability classification is VIs(4), nonirrigated.

240—Yellowhound-Woodin-Ornbaun complex, 30 to 50 percent slopes

This map unit is on hills and mountains. The vegetation is mainly Douglas-fir and redwood on the Yellowhound and Ornbaun soils and Douglas-fir and tanoak on the Woodin soil. Elevation ranges from 600 to 2,500 feet. The average annual precipitation is 50 to 70 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 220 to 270 days.

This unit is about 50 percent Yellowhound gravelly loam, 25 percent Woodin extremely gravelly sandy loam, and 15 percent Ornbaun loam. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Maymen, Zeni, Kibesillah, and Pardaloe soils and small areas of soils that have been altered by skid trails, landings, and roads. Also included are small areas that have slopes of 15 to 30 percent or 50 to 75 percent. Included areas make up about 10 percent of the total acreage of the unit. The percentage varies from one area to another.

The Yellowhound soil is deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is pale brown and light yellowish brown gravelly loam about 15 inches thick. The subsoil is light yellowish brown and pale brown extremely gravelly loam about 38 inches thick. Hard, fractured sandstone is at a depth of about 53 inches. In some areas the surface layer is gravelly sandy loam.

Permeability is moderate in the Yellowhound soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 40 to 60 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

The Woodin soil is moderately deep to bedrock and is well drained. It formed in material derived from sandstone. The surface layer is very dark brown extremely gravelly sandy loam about 6 inches thick. The subsoil is very pale brown extremely gravelly loam about 16 inches thick. Hard, fractured sandstone is at a depth of about 22 inches. In some areas the surface layer is very gravelly loam, very gravelly sandy loam, or extremely gravelly loam.

Permeability is moderate in the Woodin soil. Available water capacity is very low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

The Ornbaun soil is deep to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1/2 inch thick. The surface layer is light yellowish brown loam about 3 inches thick. The upper 37 inches of the subsoil is light brown and reddish yellow loam. The lower 19 inches is reddish yellow and pink clay loam. Soft, fractured sandstone is at a depth of about 59 inches.

Permeability is moderate in the Ornbaun soil. Available water capacity is high. The effective rooting depth is limited by weathered bedrock at a depth of 40 to 60 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

This unit is used for timber production or as watershed.

Douglas-fir, tanoak, and redwood are the main tree species on the Yellowhound and Ornbaun soils. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 140 on the Yellowhound soil and 155 on the Ornbaun soil. The potential annual production from a fully stocked stand of Douglas-fir is 630 board feet per acre on the Yellowhound soil and 770 board feet per acre on the Ornbaun soil. On the basis of a 100-year site curve, the mean site index for redwood is 135 on the Yellowhound soil and 152 on the Ornbaun soil. Trees of limited extent include Pacific madrone and canyon live oak.

Canyon live oak, Douglas-fir, and tanoak are the main tree species on the Woodin soil. On the basis of a 100-year site curve, the mean site index is 97 for Douglas-fir. The potential annual production from a fully stocked stand of Douglas-fir is 245 board feet per acre. This potential production is rarely achieved,

however, because of the inherent tendency of the Woodin soil to produce understocked stands. Trees of limited extent include Pacific madrone.

The main limitations affecting the harvesting of timber are the slope and the hazard of erosion. Wheeled and tracked equipment can be used in the more gently sloping areas, but cable yarding systems generally cause less disturbance of the soil in the steeper areas. Revegetation of exposed subsoil is difficult on the Yellowhound and Woodin soils; however, it generally is not needed for control of surface erosion because of the large amount of coarse fragments. Establishing plant cover on steep cut and fill slopes reduces the hazard of surface erosion on the Ornbaun soil. Rock for construction of roads generally is available in areas of this unit. Rocks and loose soil material may slide onto roads. This hazard increases the need for road maintenance.

Seedling establishment is a concern affecting the production of timber on the Yellowhound and Woodin soils. Droughtiness in the upper 24 inches reduces the seedling survival rate, especially on south- and southwest-facing slopes. Plant competition is also a concern. When openings are made in the canopy, invading brushy plants that are not controlled can prevent the establishment of seedlings. Reforestation can be accomplished by planting Douglas-fir and redwood seedlings on the Yellowhound and Ornbaun soils. If seed trees are present, natural reforestation of cutover areas by Douglas-fir occurs infrequently. Plantings on the Woodin soil frequently fail because of the very low available water capacity.

Among the common forest understory plants are California huckleberry and brackenfern on the Yellowhound and Ornbaun soils and hairy manzanita and canyon live oak on the Woodin soil.

The capability classification is VIe(4), nonirrigated.

241—Yorkville-Hopland association, 30 to 50 percent slopes

This map unit is on hills and mountains. The vegetation is mainly annual grasses and forbs on the Yorkville soil and hardwoods on the Hopland soil. Elevation ranges from 500 to 2,000 feet. The average annual precipitation is 45 to 60 inches, the average annual air temperature is about 57 degrees F, and the average frost-free period is 150 to 250 days.

This unit is about 40 percent Yorkville clay loam and 35 percent Hopland loam.

Included with these soils in mapping are small areas of Bearwallow, Squawrock, Witherell, and Yorktree soils and areas of Rock outcrop. Also included are small areas that have slopes of 15 to 30 percent or 50 to 75 percent. Included areas make up about 25 percent of the total acreage of the unit. The percentage varies from one area to another.

The Yorkville soil is very deep to weathered bedrock and is moderately well drained. It formed in material derived from schist. Typically, the surface layer is very dark grayish brown clay loam about 12 inches thick. The upper 5 inches of the subsoil is very dark grayish brown clay. The lower 45 inches is grayish brown clay that has reddish yellow mottles. In some areas the surface layer is loam.

Permeability is very slow in the Yorkville soil. Available water capacity is high. The effective rooting depth is limited by weathered bedrock at a depth of 60 to 80 inches. During periods of intensive rainfall, the soil is partially saturated above the subsoil for very brief periods from December through April. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare. The soil is subject to landsliding and slumping.

The Hopland soil is moderately deep to weathered bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is yellowish brown loam about 15 inches thick. The subsoil is reddish yellow loam about 15 inches thick. Soft sandstone bedrock is at a depth of about 30 inches.

Permeability is moderately slow in the Hopland soil. Available water capacity is low or moderate. The effective rooting depth is limited by weathered bedrock at a depth of 20 to 40 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

The Yorkville soil is used for livestock grazing, and the Hopland soil is used for firewood production. This unit is also used as wildlife habitat or as watershed.

The characteristic plant community on the Yorkville soil is mainly wild oat, soft chess, burclover, and ripgut brome. The main limitations affecting range management are the slope and the seasonal wetness. The wetness limits the use of equipment to dry periods. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock. The slope limits access by livestock and results in overgrazing of the less sloping areas. Fencing, water development, and the strategic location of salt blocks can improve the distribution of livestock.

California black oak, Pacific madrone, and interior live oak are the main tree species on the Hopland soil. On the basis of a 50-year site curve, the mean

site index is 44 for California black oak. The Hopland soil can produce about 30 to 35 cords per acre from a stand of trees 50 years old. Trees of limited extent include canyon live oak.

The main limitations affecting the harvesting of firewood are the slope, the hazard of erosion, and the seasonal wetness. Wheeled and tracked equipment can be used in the more gently sloping areas, but cable yarding systems generally cause less disturbance of the soil in the steeper areas. Disturbance of the protective layer of duff can be minimized by the careful use of either wheeled and tracked equipment or cable yarding systems. Unless adequate plant cover or water bars are provided, steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying. Establishing plant cover on steep cut and fill slopes reduces the hazard of surface erosion. Using wheeled and tracked equipment when the soil is wet produces ruts, compacts the surface, and can damage the roots of trees. Roads on this unit are dusty when dry. Surface treatment may be desirable during periods of heavy use. Unsurfaced roads and skid trails are slippery when wet. They may be impassable during rainy periods. Suitable surfacing of roads is needed for use during wet seasons. Rock for construction of roads generally is not available in areas of this unit. After they are cut, hardwoods can regenerate by sprouting. Regrowth is most successful if cutting is done between December and May.

Among the common forest understory plants are blue wildrye and melic grass.

The capability classification is VIe(15), nonirrigated.

242—Yorkville-Squawrock-Witherell complex, 15 to 30 percent slopes

This map unit is on hills and mountains. The vegetation is mainly annual grasses and forbs. Elevation ranges from 500 to 2,000 feet. The average annual precipitation is 45 to 60 inches, the average annual air temperature is about 57 degrees F, and the average frost-free period is 150 to 250 days.

This unit is about 40 percent Yorkville clay loam, 20 percent Squawrock gravelly loam, and 15 percent Witherell loam. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Bearwallow, Hopland, and Yorktree soils and areas of Rock outcrop. Also included are small areas that have slopes of 9 to 15 percent or 30 to 50 percent. Included areas make up about 25 percent of the total acreage of the unit. The percentage varies from one area to another.

The Yorkville soil is very deep to weathered bedrock and is moderately well drained. It formed in material derived from schist. Typically, the surface layer is very dark grayish brown clay loam about 12 inches thick. The upper 5 inches of the subsoil is very dark grayish brown clay. The lower 45 inches is grayish brown clay that has reddish yellow mottles. In some areas the surface layer is loam.

Permeability is very slow in the Yorkville soil. Available water capacity is high. The effective rooting depth is limited by weathered bedrock at a depth of 60 to 80 inches. During periods of intensive rainfall, the soil is partially saturated above the subsoil for very brief periods from December through April. The soil is also subject to landsliding and slumping. Surface runoff is rapid, and the hazard of water erosion is moderate if the surface is left bare.

The Squawrock soil is moderately deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface layer is pale brown gravelly loam about 7 inches thick. The upper 11 inches of the subsoil is pale brown very gravelly loam. The lower 14 inches is very pale brown very gravelly clay loam. Hard, fractured sandstone is at a depth of about 32 inches. In some areas the surface layer is loam.

Permeability is moderate in the Squawrock soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is rapid, and the hazard of water erosion is moderate if the surface is left bare.

The Witherell soil is shallow to bedrock and is somewhat excessively drained. It formed in material derived from sandstone. Typically, the surface layer is brown loam about 1 inch thick. The subsoil is light yellowish brown loam about 11 inches thick. Hard, fractured sandstone is at a depth of about 12 inches. In some areas the surface layer is gravelly loam.

Permeability is moderate in the Witherell soil. Available water capacity is very low. The effective rooting depth is limited by bedrock at a depth of 10 to 20 inches. Surface runoff is rapid, and the hazard of water erosion is moderate if the surface is left bare.

This unit is used for livestock grazing or wildlife habitat.

The characteristic plant community on the Yorkville soil is mainly wild oat, soft chess, burclover, and ripgut brome. The main limitation affecting range management is the seasonal wetness, which limits

the use of equipment to dry periods. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

The characteristic plant community on the Squawrock soil is mainly wild oat, soft chess, and filaree. The main limitation affecting range management is the low available water capacity. The production of forage on the Squawrock soil is limited by the amount of moisture available for plant growth. If seeding is considered, species that are tolerant of droughty conditions should be selected.

The characteristic plant community on the Witherell soil is mainly soft chess, filaree, and wild oat. The main limitation affecting range management is the shallow effective rooting depth, which reduces the production of forage. If seeding is considered, species that are tolerant of droughty conditions should be selected.

The capability classification is VIe(15), nonirrigated.

243—Yorkville-Squawrock-Witherell complex, 30 to 50 percent slopes

This map unit is on hills and mountains. The vegetation is mainly annual grasses and forbs. Elevation ranges from 500 to 2,000 feet. The average annual precipitation is 45 to 60 inches, the average annual air temperature is about 57 degrees F, and the average frost-free period is 150 to 250 days.

This unit is about 35 percent Yorkville clay loam, 30 percent Squawrock gravelly loam, and 15 percent Witherell loam. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Bearwallow, Hopland, and Yorktree soils and areas of Rock outcrop. Also included are small areas that have slopes of 15 to 30 percent or 50 to 75 percent. Included areas make up about 20 percent of the total acreage of the unit. The percentage varies from one area to another.

The Yorkville soil is very deep to weathered bedrock and is moderately well drained. It formed in material derived from schist. Typically, the surface layer is very dark grayish brown clay loam about 12 inches thick. The upper 5 inches of the subsoil is very dark grayish brown clay. The lower 45 inches is grayish brown clay that has reddish yellow mottles. In some areas the surface layer is loam.

Permeability is very slow in the Yorkville soil. Available water capacity is high. The effective rooting depth is limited by weathered bedrock at a depth of 60 to 80 inches. During periods of intensive rainfall, the soil is partially saturated above the subsoil for very brief periods from December through April. The soil is also subject to landsliding and slumping. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

The Squawrock soil is moderately deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface layer is pale brown gravelly loam about 7 inches thick. The upper 11 inches of the subsoil is pale brown very gravelly loam. The lower 14 inches is very pale brown very gravelly clay loam. Hard, fractured sandstone is at a depth of about 32 inches. In some areas the surface layer is loam.

Permeability is moderate in the Squawrock soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

The Witherell soil is shallow to bedrock and is somewhat excessively drained. It formed in material derived from sandstone. Typically, the surface layer is brown loam about 1 inch thick. The subsoil is light yellowish brown loam about 11 inches thick. Hard, fractured sandstone is at a depth of about 12 inches. In some areas the surface layer is gravelly loam.

Permeability is moderate in the Witherell soil. Available water capacity is very low. The effective rooting depth is limited by bedrock at a depth of 10 to 20 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

This unit is used for livestock grazing or wildlife habitat.

The characteristic plant community on the Yorkville soil is mainly wild oat, soft chess, burclover, and ripgut brome. The main limitation affecting range management on this soil is the seasonal wetness. The seasonal saturation limits the use of equipment to dry periods. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

The characteristic plant community on the Squawrock soil is mainly wild oat, soft chess, and filaree. The main limitation affecting range management on this soil is the low available water capacity. The production of forage is limited by the amount of moisture available for plant growth. If seeding is considered, species that are tolerant of droughty conditions should be selected.

The characteristic plant community on the Witherell soil is mainly soft chess, filaree, and wild oat. The main limitation affecting range management on this soil is the shallow effective rooting depth, which limits the production of forage. If seeding is

considered, species that are tolerant of droughty conditions should be selected.

The slope is also a limitation if this unit is used for livestock grazing. It limits access by livestock and results in overgrazing of the less sloping areas. Fencing, water development, and the strategic location of salt blocks can improve the distribution of livestock.

The capability classification is VIe(15), nonirrigated.

244—Yorkville-Yorktree-Squawrock complex, 15 to 30 percent slopes

This map unit is on hills and mountains. The vegetation is mainly annual grasses and forbs on the Yorkville and Squawrock soils and hardwoods on the Yorktree soil. Elevation ranges from 500 to 2,000 feet. The average annual precipitation is 45 to 60 inches, the average annual air temperature is about 56 degrees F, and the average frost-free period is 150 to 250 days.

This unit is about 35 percent Yorkville clay loam, 35 percent Yorktree loam, and 15 percent Squawrock gravelly loam. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Bearwallow and Witherell soils and areas of Rock outcrop. Also included are small areas that have bedrock at a depth of less than 60 inches or have slopes of 9 to 15 percent or 30 to 50 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

The Yorkville soil is very deep to weathered bedrock and is moderately well drained. It formed in material derived from schist. Typically, the surface layer is very dark grayish brown clay loam about 12 inches thick. The upper 5 inches of the subsoil is very dark grayish brown clay. The lower 45 inches is grayish brown clay that has reddish yellow mottles. In some areas the surface layer is loam.

Permeability is very slow in the Yorkville soil. Available water capacity is high. The effective rooting depth is limited by weathered bedrock at a depth of 60 to 80 inches. During periods of intensive rainfall, the soil is partially saturated above the subsoil for very brief periods from December through April. Surface runoff is rapid, and the hazard of water erosion is moderate if the surface is left bare. The soil is subject to landsliding and slumping.

The Yorktree soil is deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is dark grayish brown loam about 11 inches thick. The subsoil is grayish brown and light olive brown gravelly clay loam about 35 inches thick. The substratum is yellowish brown and pale brown gravelly clay loam about 12 inches thick. Hard, fractured sandstone is at a depth of about 58 inches.

Permeability is slow in the Yorktree soil. Available water capacity is high. The effective rooting depth is limited by bedrock at a depth of 40 to 60 inches. Surface runoff is rapid, and the hazard of water erosion is moderate if the surface is left bare.

The Squawrock soil is moderately deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface layer is pale brown gravelly loam about 7 inches thick. The upper 11 inches of the subsoil is pale brown very gravelly loam. The lower 14 inches is very pale brown very gravelly clay loam. Hard, fractured sandstone is at a depth of about 32 inches. In some areas the surface layer is loam.

Permeability is moderate in the Squawrock soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is rapid, and the hazard of water erosion is moderate if the surface is left bare.

The Yorkville and Squawrock soils are used for livestock grazing, and the Yorktree soil is used for firewood production. This unit is also used as wildlife habitat or watershed.

The characteristic plant community on the Yorkville soil is mainly wild oat, soft chess, burclover, and ripgut brome. The main limitation affecting range management on this soil is the seasonal wetness, which limits the use of equipment to dry periods. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

The characteristic plant community on the Squawrock soil is mainly wild oat, soft chess, and filaree. The main limitation affecting range management on this soil is the low available water capacity, which limits the production of forage. If seeding is considered, species that are tolerant of droughty conditions should be selected.

California black oak, interior live oak, and Pacific madrone are the main tree species on the Yorktree soil. On the basis of a 50-year site curve, the mean site index is 30 for California black oak on the Yorktree soil. Estimates of potential production have

not been made because low production makes this soil generally unsuited for commercial firewood harvesting. Trees of limited extent include Oregon white oak. Among the common understory plants are melic, blue wildrye, and vetch.

The capability classification is IVe-1(15), nonirrigated.

245—Yorkville-Yorktree-Squawrock complex, 30 to 50 percent slopes

This map unit is on hills and mountains. The vegetation is mainly annual grasses and forbs on the Yorkville and Squawrock soils and hardwoods on the Yorktree soil. Elevation ranges from 500 to 2,000 feet. The average annual precipitation is 45 to 60 inches, the average annual air temperature is about 56 degrees F, and the average frost-free period is 150 to 250 days.

This unit is about 35 percent Yorkville clay loam, 35 percent Yorktree loam, and 15 percent Squawrock gravelly loam. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Bearwallow and Witherell soils and areas of Rock outcrop. Also included are small areas that have slopes of 15 to 30 percent or 50 to 75 percent. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

The Yorkville soil is very deep to weathered bedrock and is moderately well drained. It formed in material derived from schist. Typically, the surface layer is very dark grayish brown clay loam about 12 inches thick. The upper 5 inches of the subsoil is very dark grayish brown clay. The lower 45 inches is grayish brown clay that has reddish yellow mottles. In some areas the surface layer is loam.

Permeability is very slow in the Yorkville soil. Available water capacity is high. The effective rooting depth is limited by weathered bedrock at a depth of 60 to 80 inches. During periods of intensive rainfall, the soil is partially saturated above the subsoil for very brief periods from December through April. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare. The soil is subject to landsliding and slumping.

The Yorktree soil is deep to bedrock and is well drained. It formed in material derived dominantly from sandstone. Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is dark grayish brown loam about 11 inches thick. The subsoil is grayish brown and light olive brown gravelly clay loam about 35 inches thick. The substratum is yellowish brown and pale brown gravelly clay loam about 12 inches thick. Hard, fractured sandstone is at a depth of about 58 inches.

Permeability is slow in the Yorktree soil. Available water capacity is high. The effective rooting depth is limited by bedrock at a depth of 40 to 60 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

The Squawrock soil is moderately deep to bedrock and is well drained. It formed in material derived from sandstone. Typically, the surface layer is pale brown gravelly loam about 7 inches thick. The upper 11 inches of the subsoil is pale brown very gravelly loam. The lower 14 inches is very pale brown very gravelly clay loam. Hard, fractured sandstone is at a depth of about 32 inches. In some areas the surface layer is loam.

Permeability is moderate in the Squawrock soil. Available water capacity is low. The effective rooting depth is limited by bedrock at a depth of 20 to 40 inches. Surface runoff is rapid, and the hazard of water erosion is severe if the surface is left bare.

The Yorkville and Squawrock soils are used for livestock grazing, and the Yorktree soil is used for firewood production. This unit is also used as wildlife habitat or watershed.

The characteristic plant community on the Yorkville soil is mainly wild oat, soft chess, burclover, and ripgut brome. The main limitation affecting range management on this soil is the seasonal wetness, which limits the use of equipment to dry periods. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

The characteristic plant community on the Squawrock soil is mainly wild oat, soft chess, and filaree. The main limitation affecting range management on this soil is the low available water capacity, which limits the production of forage. If seeding is considered, species that are tolerant of droughty conditions should be selected.

The slope is also a limitation in areas of this unit. It limits access by livestock. Fencing, water development, and the strategic location of salt blocks can improve the distribution of livestock.

California black oak, interior live oak, and Pacific madrone are the main tree species on the Yorktree soil. On the basis of a 50-year site curve, the mean site index is 30 for California black oak on the Yorktree soil. Estimates of potential production have

not been made because low production makes this soil generally unsuited for commercial firewood harvesting. Trees of limited extent include Oregon white oak. Among the common understory plants are melic, blue wildrye, and vetch.

The capability classification is VIe(15), nonirrigated.

Prime Farmland

Prime farmland is of major importance in meeting the Nation's short- and long-range needs for food and fiber. The acreage of high-quality farmland is limited, and the U.S. Department of Agriculture recognizes that government at local, State, and Federal levels, as well as individuals, must encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to food, feed, forage, fiber, and oilseed crops. Such soils have properties that favor the economic production of sustained high yields of crops. The soils need only to be treated and managed by acceptable farming methods. An adequate moisture supply and a sufficiently long growing season are required. Prime farmland soils produce the highest yields with minimal expenditure of energy and economic resources, and farming these soils results in the least damage to the environment.

Prime farmland soils may presently be used as cropland, pasture, or woodland or for other uses. They either are used for food and fiber or are available for these uses. Urban or built-up land, public land, and water areas cannot be considered prime farmland. Urban or built-up land is any contiguous unit of land 10 acres or more in size that is used for such purposes as housing, industrial, and commercial sites, sites for institutions or public buildings, small parks, golf courses, cemeteries, railroad yards, airports, sanitary landfills, sewage treatment plants, and water-control structures. Public land is land not available for farming in National forests, National parks, military reservations, and State parks.

Prime farmland soils commonly receive an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and length of growing season are favorable, and the level of acidity or alkalinity is acceptable. The soils have few, if any, rocks and are permeable to water and air. They are not excessively erodible or saturated with water for long periods and are not frequently flooded during the growing season. The slope ranges mainly from 0 to 6 percent.

Soils that have a high water table, are subject to flooding, or are droughty may qualify as prime farmland where these limitations are overcome by drainage systems, flood control, or irrigation. Onsite evaluation is necessary to determine the effectiveness of corrective measures. More information about the criteria for prime farmland can be obtained at the local office of the Natural Resources Conservation Service.

A recent trend in land use has been the conversion of prime farmland to urban and industrial uses. The loss of prime farmland to other uses puts pressure on lands that are less productive than prime farmland.

About 14,105 acres, or nearly 1.4 percent of the survey area, would meet the requirements for prime farmland if an adequate and dependable supply of irrigation water were available.

The map units in the survey area that meet the requirements for prime farmland are listed in table 2. On some soils included in the table, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. The location of each map unit is shown on the detailed soil maps. The soil qualities that affect use and management are described in the section "Detailed Soil Map Units." This list does not constitute a recommendation for a particular land use.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, foresters, agronomists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland or woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

Bryan D. Furman, soil conservationist, Dennis Moore, agronomist, and Roy Bowman, soil scientist, Natural Resources Conservation Service, helped prepare this section.

General management needed for crops and for hay and pasture is suggested in this section. The crops or pasture plants are identified, and the system of land capability classification used by the Natural Resources Conservation Service is explained.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading “Detailed Soil Map Units.” Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Of the 1,042,400 acres in the survey area, 2.7 percent, or about 28,000 acres, is used for crops and pasture. The cropland is mostly in Anderson Valley and on the coastal terraces from Albion to just south of Point Arena.

The soils in western Mendocino County have characteristics that affect their behavior and that require specific management practices for various uses. Using the best management practices for each soil can improve or maintain productivity.

Erosion is a management concern on the more steeply sloping soils in the survey area. Practices that help to control erosion include conservation tillage; cover crops; storm runoff management; and critical-area planting on sites for road cuts, fills, pond embankments, and stream corridors.

The climate in the survey area strongly influences the crops that can be grown. Crops that can tolerate low temperatures are needed along the coast. Varietal wine grapes, apples, and pears are the major crops in Anderson Valley. Many of the alluvial soils in Anderson Valley, such as Boontling, Feliz, and Pinole soils, are suited to grapes and apples. Bearwallow soils are also suited to grapes. Anderson Valley grapes are considered premium wine grapes and receive some of the top prices in the industry. About 1,000 acres in the survey area is used for growing wine grapes, and the acreage has been steadily increasing.

Cover crops, irrigation water management, frost protection, and surface runoff management systems are generally needed on nearly level to moderately sloping soils used for vineyards and orchards. In some cases, subsurface drains are needed on the Boontling soils, which are susceptible to

compaction by equipment or by livestock during wet periods.

Cover crops and surface runoff control systems, such as terraces, diversions, underground outlets, and grassed waterways, are needed in the more sloping vineyards and orchards to prevent sheet, rill, gully, and landslide erosion. Trickle irrigation systems are commonly used to start vines and may be needed after vines are established, depending on grape variety, soil properties, annual precipitation, and aspect.

Annual cover crops are grown in areas where trickle irrigation is used for grapes, where dryland grapes are grown, or where vineyards are disked or mowed. New winter annuals are usually seeded before October 15. Growth that occurs during the fall and winter months protects the vineyard from sheet and rill erosion. In early spring, before about April 1, mowing the cover crop to a height of 3 or more inches helps to minimize possible frost damage. After the seed has matured, the cover crop can be mowed to any height. The seed will then be available the following fall to start the annual growth cycle again.

Perennial cover crops are used in irrigated orchards and vineyards. They serve erosion-control functions similar to those of annuals but have other important characteristics. Perennial cover crops are mowed in the spring, thereby minimizing the hazard of frost damage, and are mowed through the summer as necessary. Perennial cover crops can compete for moisture and nutrients, but they may help to remove moisture from wet soils. In some cases, a drainage system may still be needed.

Late spring frosts are a management concern for grape producers. Frost protection is needed for many vineyards. Although several methods are used, overhead sprinklers are the major method of protection. The sprayed water encases young buds in ice and prevents them from freezing and being destroyed. The entire vineyard acreage must be protected at one time. The water requirement is 50 gallons per acre per minute. This large volume of water is commonly stored in on-farm reservoirs that are filled by winter runoff. Frost protection may not be necessary on hillside vineyards.

Irrigation is usually needed through the dry summer to maximize production from most crops. Most growers use wells or pump from streams. Sprinkler and trickle irrigation systems are the most common methods for irrigating fruit and pasture crops.

The cool, moist coastal terrace soils have historically been used to produce berries, bulbs, potatoes, peas, and other field and truck crops. Recently, there has been a resurgence in interest in the production of these crops. A few growers are producing cool-season vegetables for local markets. Hay, pasture, and silage are important crops for the dairy industry along the coast.

Pasture management is needed on irrigated pastures to maintain soil tilth, achieve maximum production, maintain a desirable species composition, and extend the life of the pasture. Practices needed in a pasture management program include irrigation water management, rotation grazing, fertilization, harrowing or dragging to scatter droppings, and mowing when necessary to maintain uniform growth. Grazing should begin when plants are 8 to 10 inches high and should end when 3 to 4 inches of stubble remains.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are given in the map unit descriptions. In any given year, yields may be higher or lower than those indicated because of variations in rainfall, other climatic factors, and management.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green-manure crops; and harvesting that ensures the smallest possible loss.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good-quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Yields for wine grapes are an average of high- and

moderate-producing red and white varietal grapes. High-producing white grapes yield about 0.6 ton more than average, and moderate-producing white grapes yield about 0.2 ton less than average. High-producing red grapes yield about 0.2 ton more than average, and moderate-producing red grapes yield about 0.6 ton less than average.

Crops other than those listed in the map unit descriptions are grown in the survey area, but estimated yields are not given because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, or for engineering purposes.

In the capability system, soils generally are grouped at three levels—capability class, subclass, and unit (USDA, 1961). These levels are defined in the following paragraphs.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation. Rangeland or forestry improvements can be applied.

Class VII soils have very severe limitations that make them unsuitable for cultivation. They can be used for forestry or grazing, but rangeland improvements are impractical.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units generally are designated by adding an Arabic numeral to the subclass symbol, for example, IIe-4 and IVw-2.

The capability classification of each map unit is given in table 3 and at the end of each map unit description in the section “Detailed Soil Map Units.” The numbers used to designate units within the subclasses are as follows:

0. Indicates limitations caused by stony, cobbly, or gravelly material in the substratum.

1. Indicates limitations caused by slope or by an actual or potential erosion hazard.

2. Indicates a limitation of wetness caused by poor drainage or flooding.

3. Indicates a limitation of slow or very slow permeability in the subsoil or substratum.

4. Indicates limitations caused by sandy or

gravelly soils that have a low available water-holding capacity.

5. Indicates limitations caused by a fine textured or very fine textured surface layer.

6. Indicates limitations caused by salt or alkali.

7. Indicates limitations caused by rocks, stones, or cobblestones.

8. Indicates that the soil has a low or very low water-holding capacity because the root zone generally is less than 40 inches deep over massive bedrock.

9. Indicates limitations caused by low or very low fertility, acidity, or toxicity that cannot be corrected by adding normal amounts of fertilizer or lime or by other measures.

Major Land Resource Areas

Land capability classification is further refined by designating the major land resource area (MLRA) of the soils. A major land resource area is a broad geographic area that has a distinct combination of climate, topography, vegetation, land use and management, and soils (USDA, 1981). Parts of four of these nationally designated areas are in the survey area. These areas and their numbers are California Coastal Redwood Belt, MLRA 4; Siskiyou-Trinity Area, MLRA 5; Central California Coastal Valleys, MLRA 14; and Central California Coast Range, MLRA 15. The major land resource area number is added in parentheses after the land capability class, subclass, or unit designation at the end of each map unit description in the section “Detailed Soil Map Units.”

MLRA 4, the California Coastal Redwood Belt. In this land resource area, the climate is tempered by cool marine air. The landscape is dominated by strongly sloping to very steep hills and mountains and has nearly level to steep marine terraces along the coast. The natural vegetation is mainly redwood and Douglas-fir. Elevation ranges from sea level to 2,500 feet. The average annual precipitation ranges from 35 to 80 inches. The average annual temperature is about 53 degrees F, and the average frost-free season ranges from 220 to 365 days. The summers are cool and moist with frequent fog. Abundant rainfall during the winter and numerous perennial streams provide enough water for most requirements.

Most of this land resource area is used for timber production. The marine terraces are also used for livestock grazing, hay production, pasture, or homesite development.

MLRA 5, Siskiyou-Trinity Area. This land resource area consists of the timbered mountainous land outside the influence of the marine climate. The landscape is dominated by strongly sloping to very steep hills and mountains. The natural vegetation is mainly Douglas-fir and tanoak. Elevation ranges from 500 to 4,235 feet. The average annual precipitation ranges from 40 to 80 inches. The average annual temperature is about 55 degrees F, and the average frost-free season ranges from 150 to 270 days. Most of the rainfall occurs during the winter. The summers are hot and dry, and rivers carry a low volume of water during this season.

Most of this land resource area is used for timber or firewood production.

MLRA 14, Central California Coastal Valleys. This land resource area includes the small inland valleys of the survey area—the Anderson, Laytonville, and Comptche valleys. The landscape is dominated by nearly level to moderately steep stream terraces and flood plains. In uncultivated areas, the natural vegetation is annual grasses and forbs. Elevation ranges from 160 to 2,200 feet. The average annual precipitation ranges from 40 to 60 inches. The average annual temperature is about 55 degrees F, and the average frost-free season ranges from 150 to 250 days. Most of the rainfall occurs during the winter. The summers are hot and dry, and irrigation is needed for most crops.

Most of this land resource area is used for livestock grazing, hay production, pasture, orchards, or vineyards.

MLRA 15, the Central California Coast Range. This land resource area consists of open grassland and oak-grass woodland. The landscape is dominated by moderately sloping to very steep hills and mountains. Elevation ranges from 300 to 4,000 feet. The average annual precipitation ranges from 45 to 70 inches. The average annual temperature is about 57 degrees F, and the average frost-free season ranges from 150 to 250 days. The summers are hot and dry, and most of the rainfall occurs during the winter.

Most of this land resource area is used for livestock grazing or firewood production.

Rangeland

By Richard J. King, range conservationist, and Jerry D. Owens, soil conservationist, Natural Resources Conservation Service

About 114,000 acres, or 11 percent of the survey area, is rangeland. Soils that support woody shrubs make up about 14,000 acres, or 1 percent, of the survey area. Cow-calf, stocker, and sheep operations are the most common livestock enterprises.

Privately owned rangeland in the survey area is primarily along the coast and near the eastern boundary of the survey area, including Anderson Valley. Small mountain meadows are in the forested parts of the survey area. Federal and State rangeland within the survey area is of limited importance to the livestock industry.

Rangeland vegetation in the eastern part of the survey area consists of oak grasslands that are dominated by annual grasses and forbs. Livestock use is mostly seasonal. Livestock are transported into the area during fall and winter to take advantage of the annual vegetation, which begins growth after sufficient rainfall has occurred. Stocker cattle normally are bought in late fall or early winter. The nutritional value of the herbaceous vegetation drops sharply following the burst of growth during spring. Cattle are either moved to better pasture or are shipped to market or to feedlots for finishing. Lambing on sheep ranches occurs during the winter, and lambs are sold in the spring.

In the western part of the county, coastal grasslands are generally dominated by perennial plants within forested areas. Mountain meadows are mostly dominated by perennials. Areas are used primarily for livestock year-round in the western part of the survey area. The green feed period is considerably longer in these areas than in other areas, and livestock operations are quite diverse, including a few dairies. Most of the ranches are cow-calf and sheep operations, but some are stocker operations. Some ranches have developed irrigated pastures to produce additional forage or hay.

The acreage grazed by cattle and sheep in the survey area is about equal, but sheep production is declining slightly because of predator problems. Coyotes, mountain lions, and bobcats repeatedly prey upon lambs and ewes. Losses can be so great that ranchers turn to other livestock enterprises. Although livestock grazing is the primary use of rangeland within the survey area, the development of areas for wildlife or for recreation is expected to increase as landowners seek to generate higher income from the land.

The history of range use and condition in the survey area is similar to that of all western rangeland. By the turn of the century, overgrazing and conversion to cropland had drastically changed the character of the native vegetation. The soil and other resources were significantly degraded after settlement in the area, but better livestock management practices on rangeland have substantially improved the situation in recent decades. Despite the general improvement in range condition, however, most of the rangeland in the survey area could still be significantly improved. Improvements would increase the amount of food available for livestock and wildlife, enhance opportunities for recreation, increase wood production, and help to keep water from the watershed clean.

Annual Range Sites

The range sites in the eastern part of the survey area, including Anderson Valley, are generally dominated by annual grasses and forbs. Proper grazing, management practices that increase the production of the dominant annual vegetation, and practices that ensure adequate mulch, seeding, fertilization, and water development can improve these range sites.

Many annual range sites also have considerable potential for perennial grasses and forbs. Management practices that increase perennial grasses may lengthen the green feed period, improve soil conditions for plant growth, increase productivity, minimize erosion, and improve wildlife habitat.

Perennial Range Sites

Most of the range sites in the survey area that are dominated by perennial plants are along the coast. Suitable range improvement practices for these sites include proper grazing, using a planned grazing system, seeding, applying fertilizer, and developing sources of water for livestock.

Perennial bunchgrasses are killed or weakened by overgrazing and by changes in soil properties resulting from erosion and compaction. Annual grasses and forbs readily increase as fewer bunchgrasses occupy a site. Gorse is a noxious shrub that readily invades and increases on some of the best range sites. It can be controlled or eradicated by intensive burning and cultivation and by hand grubbing.

Many species of introduced annual and perennial grasses have become naturalized on the coastal range sites. Three perennial species that have become widespread along the coast are velvetgrass, sweet vernalgrasses, and hairy oatgrass. These species are particularly aggressive on moderately or lightly grazed rangeland that was formerly used for crops. Once established, they can dominate a site. Some long-protected range sites are still dominated by these species. These sites probably have a site potential different from that of the native perennial grasslands.

Fire may have been an important factor in the health and maintenance of the perennial range sites prior to early settlement. Although livestock can retard or prevent shrub encroachment on these sites, woody vegetation will readily invade sites that are protected from grazing. Protecting sites from fire or grazing may result in increased shrub dominance, even on highly productive sites.

Shrubs

A few soils in the survey area support dense stands of shrubs. These sites generally have limited value for commercial livestock grazing but are valuable as wildlife habitat. Prescribed burning and water development can enhance habitat for wildlife on these sites.

In areas that have similar climate and topography, differences in the kind and amount of vegetation produced on rangeland are closely related to the kind of soil. Effective management is based in part on understanding the relationships among soils, vegetation, water, animals, and micro-organisms. Soils producing similar plant communities are grouped together as a range site.

Table 4 shows, for the soils that support rangeland vegetation suitable for grazing, the range site; the total annual production of vegetation in favorable, normal, and unfavorable years; the characteristic vegetation; and the average percentage of each species. Only those soils that are used as rangeland or are suited to use as rangeland are listed. Explanation of the column headings in table 4 follows.

A *range site* is a distinctive kind of rangeland that produces a characteristic natural plant community that differs from natural plant communities on other range sites in kind, amount, and proportion of range plants. The relationship between soils and vegetation was ascertained during this survey; thus, range sites generally can be determined directly from the soil map. Soil properties that affect moisture supply and plant nutrients have the greatest influence on the productivity of range plants. Soil reaction, salt content, and a seasonal high water table are also important.

Total production is the amount of vegetation that can be expected to grow annually on well managed rangeland that is supporting the potential natural plant community. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year’s growth of leaves, twigs, and fruit of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year, the amount and distribution of precipitation and the temperatures make growing conditions substantially better than average. In a normal year, growing conditions are about average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture.

Dry weight is the total annual yield per acre of air-dry vegetation. Yields are adjusted to a common percent of air-dry moisture content. The relationship of green weight to air-dry weight varies according to such factors as exposure, amount of shade, recent rains, and unseasonable dry periods.

Characteristic vegetation—the grasses, forbs, and shrubs that make up most of the potential natural plant community on each soil—is listed by common name. Under *composition*, the expected percentage of the total annual production is given for each species making up the characteristic vegetation. The amount that can be used as forage depends on the kinds of grazing animals and on the grazing season.

Range management requires a knowledge of the kinds of soil and of the potential natural plant community. It also requires an evaluation of the present range condition. Range condition is determined by comparing the present plant community with the potential natural plant community on a particular range site. The more closely the existing community resembles the potential community, the better the range condition. Range condition is an ecological rating only. It does not have a specific meaning that pertains to the present plant community in a given use.

Grazing Management

The objective in range management is to control grazing so that the plants growing on a site are about the same in kind and amount as the potential natural plant community for that site. Such management generally results in the optimal production of vegetation, control of undesirable brush species, conservation of water, and control of erosion.

Individual plants become stressed when defoliation is too frequent or too intense during the growing season. Plant stress can be minimized by controlling the frequency and intensity of grazing. Rotating grazing can maximize plant vigor and productivity.

Range site descriptions can be used as a guide to develop initial stocking rates for grazed rangeland. Stocking rates are usually expressed in terms of a standard animal unit for a specific length of time for a unit of land. The most common measurement of stocking rate is the animal unit month (AUM). One

AUM is the amount of forage required by an animal unit for 1 month. An animal unit is generally one mature cow of approximately 1,000 pounds and a calf as old as 6 months, or their equivalent. One AUM is equal to 1,000 pounds of forage, by dry weight.

The carrying capacity of a particular soil is expressed in AUM's per acre. It is determined by subtracting the amount of vegetation to be left as residue from the total amount of vegetation produced during a normal year. The remainder is the amount of available forage. A calculation of the number of animal units needed to achieve the recommended stocking rate is based on the number of acres in a particular grazing period. This procedure is a conservative estimate of the carrying capacity, which is affected by the season of use and the distribution of grazing. Estimates of annual dry matter production are given for normal, favorable, and unfavorable years in table 4.

The local offices of the Natural Resources Conservation Service and the Cooperative Extension Service can provide additional information about the productivity and management concerns of range sites as well as other conservation planning assistance on rangeland.

Woodland Management and Productivity

Donald L. Berry and Thomas E. Schott, foresters, Natural Resources Conservation Service, helped prepare this section; the Soils Committee of the Redwood Coast Chapter of the Society of American Foresters and numerous private and public foresters also provided assistance.

About 84 percent of the survey area consists of soils that support conifer and hardwood forests. Of this acreage, about 863,000 acres is considered potentially commercial forestland.

The forests of Mendocino County provide a multitude of benefits. They are an integral part of the area's scenic beauty, which attracts recreationists and vacationers. The forestland provides important habitat for fish and wildlife. Forested watersheds provide clean water for agricultural, urban, and recreational uses.

Many residents use the forests for their homesites. Jobs provided by the wood products industry are of prime importance. Softwood and hardwood lumber, wood chips, hardboard products, and firewood are produced from local forests and are the major exports from the county (Mendocino County Department of Agriculture, 1982; California Department of Forestry, 1980). Locally produced redwood siding, outdoor furniture, and other lumber products are marketed throughout the United States.

The general information provided in this section and in the section "Detailed Soil Map Units" is intended only as a guide. This information may be useful to professional resource managers, landowners, and visitors to the area for understanding the characteristics and management of forest soils in western Mendocino County. Onsite investigation by resource professionals is needed for site-specific data and may provide better solutions to resource problems than can be presented in this soil survey.

Tables 5 and 6 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. Table 5 shows woodland productivity, and table 6 shows management concerns. Some of the criteria used in rating the soils for woodland management are given in the Appendix.

Table 5 lists the *ordination symbol* for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity. The ordination system is a uniform system of labeling individual soils or groups of soils according to their potential productivity and the principal soil properties that influence the use and management of the soils for woodland. The ordination system has two levels—class and subclass.

The first element in the ordination symbol is the class. It is a number that denotes potential productivity, in cubic meters of wood per hectare per year, for an indicator tree species (1 cubic meter per hectare equals 14.3 cubic feet per acre). Potential productivity is based on the site index. The growth in cubic meters is calculated at the age of culmination of mean annual increment (CMAI) for fully stocked, unmanaged, natural stands as given in standard normal yield tables. The species that determines the ordination class is next to the ordination symbol in table 5. It is a species that is common in the area and is generally the most productive on the soil. Potential volume growth values are based on yield tables by McArdle and Meyer (1961) for Douglas-fir, by Meyer (1938) for ponderosa pine, and by Lindquist and Palley (1963) for redwood. Yield is the total wood produced in the boles of the trees to the smallest top diameter given in the tables.

The second element in the ordination symbol is the subclass. It is a capital letter that denotes certain soil or physiographic characteristics that contribute to important hazards or limitations that affect management. The letter A indicates that no limitations

or only slight limitations affect forestland use or management; C indicates restrictions or limitations caused by the kind or amount of clay in the upper part of the soil profile; F indicates restrictions or limitations resulting from a high content of rock fragments in the soil profile; R indicates excessive slope; and W indicates that excessive water, either seasonally or year-round, causes significant limitations affecting forestland use or management. If a soil has more than one limitation, the priority is as follows: R, W, C, and F. Plant competition and other special considerations are not used to determine subclass.

The *potential productivity* of merchantable or common trees on a soil is expressed as a *site index*. The average (mean) site index and the 95-percent confidence limits are listed in table 5 for each soil for which adequate data were available. Redwood site indexes are from 100-year base age curves by Lindquist and Palley (1963). Douglas-fir site indexes are from 100-year base age curves by McArdle and Meyer (1961). Procedures for converting to the 50-year base age curves by King (1966) for Douglas-fir and by Krumland and Wensel (1977) for redwood have been described by Krumland and Wensel (1977). Ponderosa pine site indexes are based on the 100-year base age curves from Meyer (1938). The red alder site index is based on the 50-year base age curve by Worthington (1960). The site index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Estimates of the potential production for each soil, in board feet per acre per year (Scribner scale) at the culmination of mean annual increment (CMAI), are given in the detailed soil map unit descriptions. Volumes are from Lindquist and Palley (1963) for redwood, McArdle and Meyer (1961) for Douglas-fir, and Meyer (1938) for ponderosa pine. Wind can reduce productivity well below the estimates for soils on exposed ridges or on sites adjacent to the ocean.

Estimating the potential productivity of soils that commonly produce hardwoods is difficult. Site indexes for soils that support California black oak are from the 50-year base age curves by Powers (1972). The estimates of hardwood yields are based on local plot measurements and on volume tables by Pillsbury and Stephens (1978).

In table 6, *slight, moderate,* and *severe* indicate the degree to which the soil affects the mortality of tree seedlings. Plant competition, which may be a significant factor, is not considered in the ratings. The ratings apply to seedlings from good stock that are properly planted during a period of sufficient rainfall. A rating of *slight* indicates that no problem is expected under normal conditions; *moderate* indicates that extra precautions are advisable; and *severe* indicates that precautions are important and replanting may be necessary.

The trees selected for planting should be those that are suited to the soils and to commercial wood production. Natural reforestation by Douglas-fir seed trees and redwood sprouts provides variable stocking results and may not be dependable for attaining the earliest optimum stocking.

The soil properties that commonly influence seedling mortality include texture, content of rock fragments, temperature, and drainage. Soils in the udic-isomesic soil climate regime generally have few limitations affecting seedling survival. Notable exceptions are poorly drained soils, such as those of the Cottoneva series, and extremely steep and gravelly soils, such as the Hotel soils on slopes of more than 75 percent. The Caspar, Ferncreek, and Quinliven soils on marine terraces have a surface layer of light gray sandy loam. Because this horizon has a low capacity for holding nutrients and water, the establishment of seedlings may be difficult on these soils.

In the ustic-isomesic soil climate regime, soil and air temperatures are higher and moisture is less abundant than in the udic-isomesic regime because of the reduced marine influence. These characteristics are especially apparent after the tree canopy is removed. The available water capacity in the upper 2 feet of the soil influences seedling mortality. Soils with an available water capacity of less than 2.5 inches in the upper 2 feet have severe limitations for redwood seedlings, especially on south-facing slopes. Partial shading may be desirable, or a different species, such as Douglas-fir, may be planted.

Soils in the xeric-mesic soil climate regime have major problems affecting seedling survival. Surface temperatures during the summer may be high enough to cause heat injury to Douglas-fir seedlings on south-facing slopes. Species selection, type and size of planting stock, availability of shade, type of harvest method, and available water capacity in the upper 2 feet are even more important for reforestation in these areas than in other areas.

Ratings of *plant competition* indicate the degree to which undesirable plants are expected to invade

where there are openings in the tree canopy. The invading plants compete with the native plants or planted seedlings. A rating of *slight* indicates little or no competition from other plants; *moderate* indicates that plant competition is expected to hinder the development of a fully stocked stand of desirable trees; and *severe* indicates that plant competition is expected to prevent the establishment of a desirable stand unless the site is intensively prepared, weeded, or otherwise managed for the control of undesirable plants. The species of competing plants and severity of competition vary, depending on soil type and past treatment of the site.

On soils in a udic moisture regime, competition from fireweed, swordfern, salal, whipplea, and California huckleberry commonly is severe. Because of the favorable growing conditions, however, seedlings generally survive and overtop this competition within a few years if replanting is done shortly after harvesting.

Soils with an ustic moisture regime present some of the most severe plant competition problems in the survey area. Tanoak, California huckleberry, and various species of ceanothus can dominate a site for several years after timber harvesting. Conifer seedlings are slow to recover because of the intense competition for moisture. Annual and perennial grasses can become established on these soils if they are not immediately reforested. These combinations of tanoak, brush, and grass result in plant competition problems that are difficult to solve.

In areas that are subject to little or no marine influence, or areas where the soils are in a xeric moisture regime, plant competition is related to the available water capacity of the soils. Productive soils have a high available water capacity. Because many plant species grow well on these soils, plant competition can be severe.

Perennial and annual grasses, forbs, various manzanitas, madrone, and black oak can dominate a site for several years after timber is harvested. Conifer seedlings are commonly slow to regenerate, and they can be suppressed by other vegetation because of the competition for moisture and light. Careful selection of the silvicultural and harvesting systems, intensive site preparation, and follow-up treatments may be needed to ensure adequate reforestation. Less productive soils have a lower available water capacity, and thus plant competition is less intense in areas of these soils, except where unwanted plants have had enough time to establish extensive root systems. On these soils, however, tree growth is slower and seedling mortality may be high because of the high temperatures and a lack of soil moisture.

Table 6 shows the *limitation for revegetating exposed subsoil*, or the degree to which revegetation is affected by exposure of subsoil layers. This exposure frequently occurs during forest management activities, mainly on road cuts and fills and on some skid roads. Land managers may want to revegetate these areas, or they may be required to do so by regulations of an agency. Revegetation may be for erosion control or for timber production. Separate ratings are given for revegetation with either grasses or trees. The characteristics of the subsoil that influence planting conditions, germination, and the subsequent growth rate are considered in the ratings. These are general ratings; they do not preclude the need for onsite investigation of individual project areas. A rating of *slight* indicates few problems with revegetation. If locally adapted grasses are properly seeded, a good stand can be expected to reduce the hazard of erosion. If trees are planted, good survival and growth rates can be expected unless compaction or other local unfavorable conditions prevail. Natural revegetation is better on soils with a slight rating than on soils with moderate or severe ratings. *Moderate* indicates that additional care is needed in the selection of methods or types of plants for erosion control. If trees are planted, some mortality and growth rates below those in undisturbed areas can be expected. *Severe* indicates that intensive measures are needed to establish erosion-control plants because exposed areas have large amounts of hard rock with only a small amount of erodible soil. Tree planting is very difficult, the survival rate is low, or growth rates are very slow or greatly reduced below those in undisturbed areas. Onsite evaluation is essential when consideration is given to revegetation in areas where the rating is severe.

Ratings of the *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or in equipment; and *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Soil wetness caused by seasonal rainfall influences the type of equipment and time of use. Soils are usually too wet for ground yarding systems from about November 15 to April 1. When they are

wet, all soils, except for sandy or very gravelly soils, are susceptible to soil compaction by wheeled or tracked equipment. Heavily compacted or puddled soils are generally less productive than other soils. The “State Forest Practice Rules” prohibit timber harvesting, except by cable yarding, during excessively wet periods. Roads are frequently impassable during the rainy season, except where they are covered with rocks or are on very gravelly or sandy soils. Some soils, such as Zeni and Ornbaun soils, are dusty when dry. Watering, oiling, or other road-surface and dust-control treatments may be desirable during periods of heavy use.

Slope gradient is an important consideration when harvesting equipment or harvesting systems are selected. In areas where slopes are less than 30 percent, few limitations affect the use of wheeled and tracked equipment. In areas where slopes are 30 to 50 percent, more care is needed in the selection of equipment suited to the site. Cable yarding systems generally cause the least soil disturbance where the terrain and road systems are conducive to their use. Where existing skid and haul roads can be used or where short, steep slopes are intermingled with flat areas, however, tractor yarding equipment can sometimes be used with minimal soil disturbance. On the steeper slopes, low ground-pressure, torsion-suspension equipment causes less soil disturbance and compaction than conventional tractor equipment (Albright, 1980; Froehlich, 1978). In large areas where slopes are more than 50 percent, less soil disturbance will result from cable yarding than from tractor yarding.

Ratings of the *hazard of soil damage from fire* are intended to be used as a general guideline when plans are made either for prescribed burns or revegetation after wildfires. The risk of damage increases with the intensity of heat. The damage is mainly related to the loss of organic matter (Wells and others, 1979). Some soils have characteristics that enable them to withstand this loss better than other soils. These characteristics are used to rate the soils for their susceptibility to damage from burning. A rating of *slight* indicates that most types of fire will not have an adverse effect on soil characteristics and future productivity; *moderate*, that some extra care in planning is needed to maintain favorable soil characteristics; and *severe*, that special management is needed to protect organic matter and thus maintain productivity.

Ratings of the *hazard of soil damage from compaction* indicate the tendency of a soil to be adversely affected by the weight of equipment or other traffic. Soil density is increased after compaction. This increased density can affect productivity by increasing the resistance to root penetration and reducing availability of oxygen to plant roots. Compaction also reduces permeability and water infiltration rates. The rating is based on the texture, content of organic matter, and content of rock fragments in the upper 10 inches (25 cm) of the soil. A rating of *slight* indicates that considerable effort would be required to compact the soil enough to restrict plant growth or water infiltration rates. *Moderate* indicates that less effort is required to cause compaction or that an easily compacted soil recovers rapidly because of the type and amount of clay. *Severe* indicates that the soil is easily affected by compaction. Compaction is most likely to occur when the soil is wet. The activities that can cause compaction include site preparation, log skidding, livestock grazing, and any other activity that applies weight on a wet soil (Alexander and Poff, 1985).

Ratings of the *hazard of sheet and rill erosion* reflect the erodibility of the soil in bare areas and when logs are yarded by tractor and cable systems. The ratings do not account for gully, ditch, or streambank erosion, mass movement caused by geologic conditions, unusual local moisture conditions, ground disturbance, or manipulation of vegetation. Soils that have an obvious tendency to slump or become gullied or that are susceptible to mass movement are identified in the map unit descriptions. The use of slope stability maps and onsite investigation of these hazards are strongly recommended.

The rating for bare areas is included as a basis for comparison with all other soils nationwide. The rating is valid only for a soil without vegetation, mulch, or other ground cover. This condition is very uncommon in this survey area. An extremely hot fire, tillage for agriculture, road construction, or attempted conversions to other land uses could result in bare soil conditions. The rating provides a general guide to the erodibility of exposed surface soil on skid roads and landings. This rating is based on the slope of the land and the erodibility of the soil. More information regarding ratings of the erosion hazard is in the Appendix.

In areas where logs are yarded by tractor or cable systems, the hazard of sheet and rill erosion is *slight* if the expected soil loss is small, *moderate* if measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive soil loss. The ratings are based on approximately 180 transects that were done to determine common conditions in recently

harvested areas, without site preparation or burning, in Northern California (Berry, 1983). The remaining overstory and understory vegetation, logging slash, root systems, and water bars reduce the erosion hazard below that for bare soil. The hazard of sheet and rill erosion is generally slight in the harvested areas as a whole where cable yarding is used. Tractor yarding usually results in a greater hazard of erosion on steep slopes (Larson and Sidle, 1980).

Erosion rates on skid roads within harvested areas are frequently high. Coupled with the possibility of reduced growth caused by compaction and the removal of surface soil horizons on deeply disturbed skid roads, high skid road density can substantially reduce the total productivity (Wert and Thomas, 1981; Klock, 1982). When used together, the ratings of erosion hazard, susceptibility to compaction, and limitation for revegetating exposed subsoil can help the user to decide whether a significant reduction in future growth rates is likely.

Conservation practices that can prevent excessive soil loss and degradation of water quality vary by site. Proper location, design, and installation of roads, culverts, water bars, and stream crossings are critical. Seeding or mulching cut and fill slopes can reduce the hazard of sheet and rill erosion on highly erodible soils. Buffer strips along streams help to prevent sedimentation of the streams, control streambank erosion, and maintain favorable water temperature.

Soil properties, particularly erodibility, should be considered when site preparation for tree planting is planned. Machinery, chemicals, and fire can have adverse effects on soil properties and erosion rates if their use is not properly planned and applied. Selection and proper use of equipment and practices are the keys to controlling erosion during forest management activities. Regulatory and technical guidelines for erosion control are available in the “State Forest Practice Rules” and in numerous State, Federal, and university publications.

A few soils in the survey area have chemical toxicities or imbalances that hinder tree growth. Soils that formed in serpentinitic parent material are known to have ratios of calcium to magnesium that are detrimental to the growth of Douglas-fir and redwood (Zinke, 1958). Large acreages of these soils are on Red Mountain near Leggett. Soils of the Comptche series appear to have an adverse effect on the growth of Douglas-fir but not of redwood. These soils are throughout the survey area.

Insect and disease problems occur readily when trees are under stress. Where they have chemical imbalances or insufficient or excessive moisture, soils can cause tree stress. Drought-induced disease and insect problems are most likely to occur in areas of Hollowtree, Holohan, Hopland, Pardaloe, Tyson, Wohly, Woodin, and Yorktree soils and Haploxeralfs on terraces. Problems related to excess soil moisture are most likely to occur in areas of Cottoneva and Ferncreek soils.

Windthrow can be a problem where soil conditions cause shallow rooting of trees. Shallow, compacted, or poorly drained soils can inhibit deep root development. Timber, houses, and other property improvements may be damaged where these conditions exist. Trees in areas of Haploxeralfs on terraces around Laytonville are susceptible to windthrow. The windthrow hazard can be minimized by modifying harvest boundaries and silvicultural systems and by establishing buildings away from trees in these areas.

Forest Cover Types

The major forest cover types (Eyre, 1980) in the survey area include redwood, Douglas-fir-tanoak-madrone, Pacific-Douglas-fir, California black oak, and canyon live oak.

Substantial acreage in the Douglas-fir-tanoak-madrone and California black oak types that are now dominated by hardwood species previously had a large conifer component. These areas are slowly returning to their earlier predominance by the conifers. Cover types of limited extent include red alder, Douglas-fir-western hemlock, Oregon white oak, knobcone pine, and Pacific madrone-ponderosa pine-Douglas-fir. While not formally recognized as a major forest cover type, the coastal portion of the survey area also includes bishop pine and Mendocino cypress (pygmy) forest types.

Forest Soil Climate Zones

The species and forest types in the survey area vary with soil, climate, relief, aspect, and history of disturbance. Three major soil climate regimes, as recognized by “Soil Taxonomy” (USDA, 1975), exist under forest vegetation in the survey area. Soil temperatures at a depth of 20 inches and duration and season of soil moisture are used to establish these soil climate regimes. The soil climate regimes are strongly influenced by the cool, moist marine air from the Pacific Ocean.

Each soil climate regime and the plant communities that typify these regimes have been identified and are described in this section. The vegetation studies by Waring and Major (1964) and

Becking (1967) were used in the establishment of these soil-plant relationships. Key species were used by soil mappers as an aid to field identification of soil climate regime. These plant indicators may be useful to forest land managers in identifying soils and selecting management alternatives.

Udic-isomesic (general soil map unit 3).—This soil climate regime is at elevations below 1,000 feet between the ocean and the first main north-south ridge. It extends inland along the Noyo River nearly 20 miles, but generally it lies within 5 to 10 miles of the coast. Where frequent heavy summer fog is intercepted by a tree canopy, a significant amount of moisture is added to the soil (Azevedo and Morgan, 1974). Soils have water available for plant growth most or all of the year, and average soil temperatures at a depth of 20 inches vary by less than 5 degrees C between summer and winter. Redwood generally makes up 50 percent or more of the canopy. Understory plants, such as swordfern and oxalis, frequently form a dense, lush ground cover. Species composition on a site is variable, depending on the soil type and past disturbance.

Trees in this zone, in the order of predominance, include redwood, Douglas-fir, tanoak, grand fir, California-laurel, bishop pine, western hemlock, and Sitka spruce. Redwood is a key species only where it makes up 50 percent or more of the ground cover. Shrubs, in the order of predominance, include California huckleberry, rhododendron, salal, poison oak, Oregongrape, waxmyrtle, blueblossom ceanothus, thimbleberry, whipplea, and hairy manzanita. Forbs, in order of predominance, include swordfern, oxalis, trillium, bedstraw, brackenfern, false Solomons seal, iris, starflower, violet, toothwort, fairyslipper orchid, and mint. Swordfern, oxalis, and starflower are key species only where they make up 50 percent or more of the ground cover.

Some soils in this zone of strong marine influence support vegetation other than the common species. Soils along the river bottoms also support other kinds of vegetation. The well drained Bigriver soils, which have a seasonal high water table at a depth of more than 5 feet, are some of the most productive forest soils in the world. Dense stands of redwood with scattered bigleaf maple, red alder, and California-laurel are common. The understory is typically a mat of oxalis, bedstraw, false Solomons seal, trillium, and starflower with scattered swordfern, thimbleberry, and poison oak. The somewhat poorly drained Cottoneva soils, which have a seasonal high water table at a depth of 2 to 3 feet, are unproductive. Redwood in areas of these soils is typically stunted, and red alder is dominant. One of the best indicators of these soils is an abundance of nettles in the understory. Other water-loving plants, such as salmonberry, waterleaf, oxalis, swordfern, poison oak, and sugarscoop, are common.

Soils associated with the pygmy forest are within the udic moisture regime. These soils and associated vegetation have been intensively studied and described by Sholars (1982) and by Jenny and others (1969).

Ustic-isomesic (general soil map unit 4).—This soil climate regime is mainly at elevations between 500 and 2,000 feet. It is within the zone of moderate marine influence. The fog influence is less pronounced than in the udic moisture regime, but some moisture is added to the soil where the tree canopy causes water to precipitate from the fog. The fog is less dense and does not blanket this zone as frequently as in the wetter zone at the lower elevations. The soils are dry for part of the summer, and there is little variation between summer and winter soil temperatures at a depth of 20 inches. The first continuous north-south range of mountains inland from the coast that reaches 2,000 feet forms an effective barrier to the encroachment of marine air. In some drainageways, such as the Noyo River watershed, this zone extends inland 20 miles or more. In other areas, such as along Elkhorn Ridge 7 miles north of Branscomb, the marine influence stops within 8 miles of the coast. The upper elevation limit of 2,000 feet is substantiated by moisture-temperature transect data, vegetation changes, and observations of summer fog.

Redwood is the most reliable indicator of this zone. It typically makes up 15 to 50 percent of the tree canopy. Douglas-fir, tanoak, and Pacific madrone are also dominant species. Understory vegetation is typically dense, and the dominant species are California huckleberry and tanoak. Species composition on a site varies, depending on aspect, soil type, and past disturbance.

Trees common in this zone, in the order of predominance, include Douglas-fir, redwood, tanoak, Pacific madrone, canyon live oak, sugar pine, chinkapin, and California-laurel. Shrubs, in the order of predominance, include California huckleberry, poison oak, rose, hairy manzanita, blueblossom ceanothus, coast whitethorn, rhododendron, salal, and waxmyrtle. Rhododendron, salal, and waxmyrtle are common in this moisture regime in the area north of Usal, but they are more typical in the wetter (udic) regime. Forbs in this zone, in the order of predominance, include brackenfern, iris, starflower, swordfern, violet, oxalis, bedstraw, and pyrola.

Starflower, swordfern, and oxalis are scattered but consistent components of the understory in this regime, but they are not as dense and lush as in the wetter (udic) regime.

Xeric-mesic (general soil map unit 5).—This soil climate regime exists on the remaining forested and heavily brush-covered land in the survey area. It is subject to little or no marine influence. Soils are usually dry from early June to October. Soil temperature at a depth of 20 inches varies by more than 9 degrees F between summer and winter. Overstory and understory plant communities are extremely diverse. Species composition is determined by soil type, aspect, elevation, total rainfall, summer temperatures, and past disturbance. The best indicator of this climate regime is the absence of the key species for the wetter udic and ustic regimes. Trees common in this zone include Douglas-fir, tanoak, Pacific madrone, canyon live oak, interior live oak, California black oak, nutmeg, Oregon white oak, California-laurel, sugar pine, and ponderosa pine. Shrubs include poison oak, hairy manzanita, Eastwood manzanita, greenleaf manzanita, toyon, and rose. Forbs and grasses include brackenfern, iris, bedstraw, annual bromes, blue wildrye, and wild pea.

Areas of this soil climate regime in the southern part of the survey area have a longer hot and dry period than areas in the northern part. Rainfall amounts are generally higher in the northern part than in the southern part.

Recreation

D.W. Patterson, biologist, Natural Resources Conservation Service, helped prepare this section.

Recreation is an important land use in the survey area. Nine State parks and recreation areas in western Mendocino County draw visitors from throughout the nation. The Mendocino coast and mountains have diverse and unique scenic resources, including beaches, estuaries, wetlands, rivers (fig. 6), large expanses of grassland and brushland, and spectacular forests of redwood and Douglas-fir. There are no National forests in the survey area, but publicly owned lands include State parks, the Jackson State Forest, and very small areas managed by the Bureau of Land Management. Most of the survey area is owned by private ranches and timber companies; hunting and other recreational uses are regulated on these lands. Fishing for steelhead in major rivers and streams is a national attraction. Subdivisions for homes and recreational dwellings can have environmental impact, especially if access roads and house pads are constructed on slopes of more than 30 percent. Permanent water diversions established on streams for domestic purposes reduce downstream flows. If an area has many water diversions, fish and wildlife can be negatively affected. Other domestic water sources, such as springs and wells, are extremely limited.

The soils of the survey area are rated in table 7 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 7, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties generally are favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or a combination of these measures.

The information in table 7 can be supplemented by other information in this survey, for example, interpretations for local roads and streets in table 8 and interpretations for septic tank absorption fields in table 9.

Camp areas require site preparation, such as shaping and leveling the camp site and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils are gently sloping and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most

Figure 6.—The Albion River, about one-half mile from its outlet at the Pacific Ocean near Albion. This river and other coastal rivers support important runs of anadromous steelhead and salmon.

vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are

firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

D.W. Patterson, biologist, Natural Resources Conservation Service, and Jack W. Booth, wildlife biologist, California Department of Fish and Game, helped prepare this section.

The varied and often contrasting natural environments of western Mendocino County support a wide variety of habitat for fish and wildlife. Fog-dominated ocean-facing watersheds are moister and cooler than east-facing watersheds.

Perennial streams, such as the Noyo and Navarro Rivers, support important runs of anadromous steelhead and salmon, resident trout, and coast cutthroat trout. Various other fish species inhabit coastal streams and estuaries. Perennial streams on east-facing watersheds are tributary to the larger Eel and Russian Rivers. These streams also support a diversity of fish species. Livestock and farm ponds are capable of supporting warmwater game fish, such as largemouth black bass and sunfish. If proper management is applied, ponds near the ocean are capable of supporting trout.

The kind and abundance of wildlife that populate an area depend largely on the amount and distribution of food, cover, and water. If any one of these elements is inadequate or inaccessible, wildlife may be scarce and some species may be absent. Soil characteristics are prime considerations when plans are made for wildlife habitat. Together with the climate, soils directly affect the kind and amount of vegetation that is available to wildlife as food and cover. Soil properties also affect the feasibility of constructing water impoundments. Soil information cannot be used alone; the influence of domestic and feral livestock, public recreation, and other uses on rangeland and forestland must also be considered.

There are four general types of wildlife habitat. These are woodland, rangeland, openland, and wetland.

Woodland habitat consists of areas of coniferous trees, broadleaf trees, shrubs, and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, blue grouse, bandtail pigeon, songbirds, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

Rangeland habitat consists of areas of wild herbaceous plants and mixtures of both coniferous and broadleaf trees. Wildlife attracted to these areas include deer, blue grouse, songbirds, hawks, dove, California valley quail, wild turkey, and coyote.

Openland habitat consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include California valley quail, dove, songbirds, rabbits, raccoon, and gray fox.

Wetland habitat consists of marshy or swampy shallow water areas of both fresh and saline water. These areas are associated with perennial and intermittent streams, ponds, springs, and seeps. Some of the wildlife attracted to such areas are ducks, geese, shore birds, muskrat, river otter, mink, and raccoon.

The soils of the survey area can be divided into three habitat-soil groups. Each group consists of soils that have similar characteristics and produce or have the potential to produce the same general type of habitat, which in turn supports certain species of wildlife. Although soil characteristics alone rarely dictate the presence or absence of a particular wildlife species, the vegetative cover is strongly influenced by soil characteristics. The soil characteristics, vegetation, wildlife habitat and habitat elements, and management considerations for each group are described in the following paragraphs. More information about the soils in each group is available under the heading “General Soil Map Units.”

Habitat-soil group 1.—This group includes the soils in general soil map unit 1. These soils are on marine terraces and coastal hills and mountains. Slopes range from gently sloping to moderately steep. Soils in this group are very deep and are poorly drained to moderately well drained.

Vegetation consists of coniferous forests of redwood, bishop pine, and grand fir. Included are large areas of coastal perennial grassland. Areas of this group are transected by perennial and intermittent streams and associated riparian woodlands.

This group contains woodland and rangeland habitat and minor but significant amounts of wetland habitat. Wildlife habitat elements are primarily coniferous trees, herbaceous plants, shrubs, and wetland plants.

Important management considerations include using sustained-yield woodland harvest methods, which retain uneven-age trees; using timber harvest practices that protect the soil and plant resources;

retaining native trees, both living and dead; ensuring proper grazing use by domestic livestock; and providing a dependable water supply.

Habitat-soil group 2.—This group includes the soils in general soil map unit 2. These soils are on stream terraces and flood plains in the Anderson and Laytonville Valleys. Slopes range from nearly level to moderately steep. Soils in this group are very deep and are somewhat poorly drained to well drained.

Vegetation is mainly vine and orchard crops and annual grasses interspersed with small scattered areas of oaks. Streamside vegetation associated with waterways is also included in this group.

Openland, rangeland, and wetland habitat types are dominant. Wildlife habitat elements are primarily agricultural crops, herbaceous plants, and smaller areas of wetland plants and broadleaf trees.

Important management considerations include retaining streamside vegetation; maintaining the diversity of crops and cropping patterns; maintaining or establishing odd areas of herbaceous plants adjacent to cropland; maintaining or establishing blocks or rows of shrubs, trees, or both; maintaining wetlands; and providing a dependable water supply.

Habitat-soil group 3.—This group includes the soils in general soil map units 3, 4, and 5. These soils are on hills and mountains. Slopes range from strongly sloping to extremely steep. Soils in this group are moderately deep to very deep and are well drained.

Vegetation is primarily mixed conifer forests of redwood and Douglas-fir and varying understories and scattered areas of broadleaf trees and brush. Areas of this group are dissected by perennial and intermittent streams and associated riparian trees and shrubs.

This group includes large areas of woodland habitat that are fairly diversified by waterways and uneven-age trees. Wildlife habitat elements are primarily coniferous trees, shrubs, herbaceous plants, and broadleaf trees.

Important management considerations include ensuring proper grazing use by domestic livestock, providing a dependable water supply, and retaining native trees, both living and dead.

Habitat-soil groups provide a general guide to the habitat types and elements best adapted to soils within each group, but the individual soils within each group have varying characteristics that determine the potential and feasibility of managing or improving habitat on that soil. Land planners and managers should consider the characteristics of soils in consultation with biologists, agronomists, range conservationists, soil scientists, and foresters when plans are made for the management or development of wildlife habitat. Water-retention structures, such as ponds, may be needed for the improvement of wildlife habitat. Interpretations for embankments and for reservoir areas are provided in table 11.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the “Soil Properties” section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary

estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 8 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features generally are favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrinking and swelling, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills generally are limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, potential for frost action, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 9 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features generally are favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or

minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 9 also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 9 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in table 9 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, and soil reaction affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to wind erosion.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water

table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 10 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel, or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet and have a water table at a depth of less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 10, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the taxonomic unit descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is as much as 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are naturally fertile or respond well to fertilizer and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that

have an appreciable amount of gravel or stones, or that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel or stones, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils generally is preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 11 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features generally are favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even more than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders or organic matter. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table and permeability of the aquifer. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; and susceptibility to flooding. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity in the root zone. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind erosion or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed

channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Drainage

Soil drainage refers to the frequency and duration of periods that the soil is saturated or partially saturated with water. A soil is considered saturated when all pores are filled with water. Proper planning for urban development and for successful timber and crop production depends on a knowledge of the times and depths at which the soil is saturated. Each soil series in the survey area has been assigned a drainage class.

Soil drainage is influenced by climate, slope, landscape position, and characteristics of the soil. Precipitation, runoff, the amount of moisture entering the soil, and the rate of water movement through the soil affect the degree and duration of wetness.

Soil color patterns can be used to infer drainage conditions in a soil. During the course of the survey, soil scientists described and recorded the colors and patterns of colors they observed in the soils. Soil color is determined mainly by the presence of organic matter and iron. In soils that are not saturated with water, iron is in contact with oxygen. This iron is generally brownish or reddish, is immobile, and does not move with soil water. The Ornbaun soils have reddish colors that are typical of well drained soils. When a soil is saturated, iron in the soil has limited contact with oxygen. Under these conditions, iron can change into a mobile form that moves with the soil water. As this mobile iron leaves an area within the soil profile, a grayish color remains. A soil that is subject to winter saturation and summer drying may have a mixture of brownish and grayish colors. This mixed pattern of colors is called mottling. Mottles are irregular spots of color, and the matrix color is the background or dominant color of the soil. The poorly drained Shinglemill soils have grayish mottles in a brownish matrix. In some soils the entire soil matrix is grayish, indicating a nearly complete removal of iron. The very poorly drained Aborigine soils are examples.

Soil scientists monitored and recorded the depth to free water at sites representative of the dominant soils in the survey area. As used here, the term free water refers to water that stands in an unlined borehole 5 feet deep. Observations made throughout the year determined seasonal fluctuations in the depth to free water. Also, observations made over a period of several years account for year-to-year variation.

Correlations were made between the soil color patterns observed and the depth to free water at the monitoring sites. It was determined that the depth to grayish soil colors was directly related to the average depth of free water during the wet winter season. The Shinglemill soils, which have a depth to free water between 12 and 30 inches, had grayish mottles at a depth of about 25 inches. It was also determined that the dominance of grayish color, either in the matrix or in mottles, was related to the length of time the soil was saturated. The Shinglemill soils, which have grayish mottles in a brownish matrix, were saturated for a shorter period of time than the Aborigine soils, which have a grayish matrix. The relationships established at the monitored sites were used to estimate drainage characteristics of soils throughout the survey area.

Because of annual variability in rainfall, the depth to and duration of saturated soil conditions are not constant. Therefore, the drainage class assigned to a soil series reflects the drainage condition in most but not all years.

The six drainage classes recognized in this survey area are:

Somewhat excessively drained. Generally, permeability in these soils ranges from moderate to rapid and available water capacity ranges from very low to moderate. Without irrigation, only a narrow range of crops can be grown and yields are low. No mottling is present in the soil profile.

Well drained. Generally, permeability in these soils ranges from slow to rapid and available water capacity ranges from low to very high. The soils retain optimum amounts of moisture, but they are not wet close enough to the surface or long enough during the growing season to adversely affect crop yields. No mottling is present in the soil profile.

Moderately well drained. These soils are saturated at a depth of 48 to 60 inches for brief periods (2 to 7 days) after heavy rain from December through April. Grayish mottles are at a depth of 48 to 60 inches, or reddish mottles are at a depth of more than 20 inches. The soils commonly have a slowly permeable or very slowly permeable layer that restricts the downward movement of water. This layer may be at a depth of more than 60 inches. The soils are not saturated from early summer through fall. Planting and harvesting or the yields of some field crops may be affected unless artificial drainage is provided.

Somewhat poorly drained. These soils are

saturated for brief or long periods (2 days to 1 month) after heavy rain from December through April. The saturated zone starts at a depth of 30 to 48 inches and extends to a depth of more than 60 inches. Grayish mottles or matrix colors are at a depth of 30 to 48 inches. The soils commonly have a slowly permeable layer that restricts the downward movement of water. The soils are not saturated from early summer through fall. Planting and harvesting or crop growth may be markedly restricted unless artificial drainage is provided.

Poorly drained. These soils are saturated for long periods (7 days to 1 month) after heavy rain from December through April. The saturated zone starts at a depth of 12 to 30 inches and extends to a depth of more than 60 inches. Grayish mottles or matrix colors are at a depth of 12 to 30 inches. The soils commonly have a slowly permeable layer that restricts the downward movement of water. The soils are not saturated from early summer through fall. The soils are so wet that the growth of most perennial woody crops is severely restricted unless artificial drainage is provided.

Very poorly drained. These soils are saturated for long or very long periods (7 days to more than 1 month) after heavy rain from December through April. The saturated zone starts at a depth of less than 12 inches and extends to a depth of more than 60 inches. Grayish mottles or matrix colors are at a depth of less than 12 inches. The soils commonly have a slowly permeable layer that restricts the downward movement of water. The soils are not saturated from early summer through fall. The soils are so wet that the growth of most perennial woody crops is severely restricted unless artificial drainage is provided.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features listed in tables are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 12 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each taxonomic unit under the heading "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added; for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (ASTM, 1993) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 1986).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification; for example, SC-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

Rock fragments 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are

based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index generally are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 13 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each taxonomic unit under the heading "Soil Series and Their Morphology."

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrinking and swelling, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earth-moving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $^{1}/_{3}$-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, rock fragment content, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the

change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, very fine sand, sand, and organic matter (as much as 4 percent) and on soil structure and permeability. The estimates are modified by the presence of rock fragments. Values of K range from 0.05 to 0.43. The higher the value, the more susceptible the soil is to sheet and rill erosion.

Erosion factor T is an estimate of the maximum average rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to wind erosion in cultivated areas. The groups indicate the susceptibility of soil to wind erosion. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are as follows:

1. Coarse sands, sands, fine sands, and very fine sands.

2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, ash material, and sapric soil material.

3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay.

5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material.

6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay.

7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material.

8. Soils that are not subject to wind erosion because of coarse fragments on the surface or because of surface wetness.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 13, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Tables 14 and 15 give estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the infiltration of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflow from streams, by runoff from adjacent slopes, or by inflow from high tides. Shallow water standing or flowing for short periods after rainfall or snowmelt is not

considered to be flooding. Standing water in swamps and marshes or in closed depressional areas is considered to be ponding.

Table 14 gives the frequency and duration of flooding and the time of year when flooding is most likely to occur.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, or frequent. *None* means that flooding is not probable, *rare* that it is unlikely but is possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year), *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year), and *frequent* that it occurs often under normal weather conditions (the chance of flooding is more than 50 percent in any year). Duration is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month). The time of year that flooding is most likely to occur is expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information on flooding is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and level of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 14 are the depth to the seasonal high water table; the kind of water table—that is, perched or apparent; and the months of the year that the water table usually is highest. A water table that is seasonally high for less than 1 month is not indicated in the table.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower water table by a dry zone.

Two numbers in the column showing depth to the water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. “More than 6.0” indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

In table 15, *depth to bedrock* is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

A *cemented pan* is a cemented or indurated subsurface layer within a depth of 5 feet. Such a pan causes difficulty in excavation. Pans are classified as thin or thick. A *thin* pan is one that is less than 3 inches thick if continuously indurated or less than 18 inches thick if discontinuous or fractured. Excavations can be made by trenching machines, backhoes, or small rippers. A *thick* pan is one that is more than 3 inches thick if continuously indurated or more than 18 inches thick if it is discontinuous or fractured. Such a pan is so thick or massive that blasting or special equipment is needed in excavation.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low, moderate,* or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (USDA, 1975). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 16 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Alfisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Xeralf (*Xer*, meaning dry, plus *alf*, from Alfisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haploxeralfs (*Hapl*, meaning central suborder concept, plus *xeralf*, the suborder of the Alfisols that has a xeric moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. An example is Ultic Haploxeralfs.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, thickness of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, mesic Ultic Haploxeralfs.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer, subsoil, or substratum can differ within a series.

Soil Relationship Charts

The following charts show some of the relationships between soil series. The charts are presented according to general soil map unit.

In the first two charts, drainage and particle-size class are the primary variables used to differentiate the soil series. For example, the Blacklock series consists of very poorly drained soils that have a sandy particle-size class and the Mallopass series consists of moderately well drained soils that have a fine-loamy particle-size class.

Soils in the same block on the charts have the same drainage class and particle-size class. These soils are distinguished from one another by other characteristics, such as soil depth, soil climate, or chemical properties. These characteristics are described in the series descriptions.

In the rest of the charts, soil depth and particle-size class are the primary variables used to differentiate the soil series. For example, in the chart for general soil map unit 3, the Hotel series consists of moderately deep soils that have a loamy-skeletal particle-size class and the Vandamme series consists of deep soils that have a clayey particle-size class.

On these charts, soils in the same block have the same depth and particle-size classes. These soils are distinguished from one another by other characteristics, such as soil drainage, soil climate, or chemical properties. These characteristics are described in the series descriptions.

General Soil Map Unit 1—Ferncreek-Quinliven-Shinglemill

Drainage class	Particle-size class: Sandy	Loamy-skeletal	Coarse-loamy	Fine-loamy or loamy	Fine or clayey
Very poorly drained	Blacklock				Aborigine
Poorly drained			Tregoning		Flumeville Shinglemill
Somewhat poorly drained			Cleone	Cabrillo Windyhollow	Ferncreek Gibney
Moderately well drained				Mallopass Stornetta	Quinliven
Well drained			Harecreek	Abalobadiah Biaggi Bruhel Caspar Crispin Havensneck Vizcaino	Fishrock Gibwell Iversen Vandamme
Somewhat excessively drained	Sirdrak Mackerricher		Heeser	Seaside	

General Soil Map Unit 2—Boontling-Pinole-Cole

Drainage class	Particle-size class: Sandy	Loamy-skeletal	Coarse-loamy	Fine-loamy or loamy	Fine
Very poorly drained					Perrygulch
Poorly drained.					
Somewhat poorly drained				Boontling	Cole
Moderately well drained.					
Well drained				Bearwallow Feliz Pinole Wolfey	
Somewhat excessively drained		Talmage			

General Soil Map Unit 3—Irmulco-Dehaven-Vandamme

Depth class	Particle-size class: Loamy-skeletal	Clayey-skeletal	Coarse-loamy	Fine-loamy	Clayey
Shallow.					
Moderately deep	Hotel			Tramway Usal	
Deep	Branscomb Dehaven			Glenblair Irmulco	Vandamme
Very deep			Bigriver Cottoneva	Carlain Glenblair Irmulco	

General Soil Map Unit 4—Ornbaun-Zeni-Yellowhound

Depth class	Particle-size class: Loamy-skeletal	Clayey-skeletal	Coarse-loamy	Fine-loamy	Fine or clayey
Shallow.					
Moderately deep	Kibesillah Woodin			Zeni	
Deep	Yellowhound			Ornbaun	Comptche Threechop
Very deep	Frenchman			Gschwend	Comptche

General Soil Map Unit 5—Casabonne-Holohan-Wohly

Depth class	Particle-size class: Loamy-skeletal	Clayey-skeletal	Loamy	Coarse-loamy	Fine-loamy	Clayey
Shallow or very shallow	Etsel Hiltabidel		Maymen Snook			
Moderately deep	Hollowtree Tyson Woodin	Dann			Garcia Hopland Wohly	Gube
Deep	Pardaloe Yellowhound				Casabonne Updegraff	
Very deep	Holohan					Littlered

General Soil Map Unit 6—Hopland-Squawrock-Witherell

Depth class	Particle-size class					
	Loamy-skeletal	Clayey-skeletal	Loamy	Coarse-loamy	Fine-loamy	Clayey
Shallow			Witherell Wolfey			
Moderately deep	Squawrock				Bearwallow Garcia Hopland Wohly	
Deep.						
Very deep.						

General Soil Map Unit 7—Yorkville-Shortyork-Witherell

Depth class	Particle-size class					
	Loamy-skeletal	Clayey-skeletal	Loamy	Coarse-loamy	Fine-loamy	Fine
Shallow			Witherell			
Moderately deep	Shortyork Squawrock Tyson				Hopland	
Deep					Yorktree Yorkville	
Very deep					Yorkville	

Soil Series and Their Morphology

In this section, each taxonomic unit recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each unit. A pedon, a small three-dimensional area of soil, that is typical of the unit in the survey area is described. The detailed description of each soil horizon follows standards in the “Soil Survey Manual” (USDA, 1993). Many of the technical terms used in the descriptions are defined in “Soil Taxonomy” (USDA, 1975). Unless otherwise stated, matrix colors in the descriptions are for dry soil. Following the pedon description is the range of important characteristics of the soils in the unit.

The map units of each taxonomic unit are described in the section “Detailed Soil Map Units.”

Abalobadiah Series

The Abalobadiah series consists of well drained soils that are moderately deep to weathered bedrock. These soils formed in material weathered from sandstone. They are on coastal hills and mountains. Slopes range from 9 to 75 percent. The mean annual precipitation is about 45 inches, and the mean annual air temperature is about 53 degrees F.

These soils are classified as fine-loamy, mixed, isomesic Pachic Argiustolls.

Typical pedon of Abalobadiah loam, in an area of Abalobadiah-Bruhel-Vizcaino complex, 50 to 75 percent slopes; 450 feet south and 1,700 feet west of the northeast corner of sec. 20, T. 20 N., R. 17 W., MDBM, Inglenook quadrangle:

A1—0 to 3 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist;

moderate fine and medium subangular blocky structure parting to strong very fine and fine granular; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine and fine tubular and interstitial pores; moderately acid (pH 6.0); clear smooth boundary.

A2—3 to 13 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; strong very fine, fine, and medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine and few medium roots; many very fine and fine tubular and interstitial pores; moderately acid (pH 6.0); clear wavy boundary.

Bt—13 to 21 inches; brown (10YR 5/3) sandy clay loam, dark brown (10YR 3/3) moist; strong very fine, fine, and medium subangular blocky and strong very fine angular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and few medium roots; many very fine and common fine tubular and interstitial pores; few thin clay films on faces of peds and lining pores; 2 percent moderately hard subangular cobbles; slightly acid (pH 6.5); abrupt wavy boundary.

BCt—21 to 39 inches; very pale brown (10YR 7/4) gravelly sandy loam, yellowish brown (10YR 5/6) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; many very fine and fine tubular and interstitial pores; common thin clay films on faces of peds and lining pores; 30 percent moderately hard angular sandstone gravel; slightly acid (pH 6.5); clear irregular boundary.

Crt—39 to 60 inches; very pale brown (10YR 7/4), soft sandstone that crushes to sandy loam, light yellowish brown (10YR 6/4) moist; few thin clay films on fracture faces that are less than 1 millimeter wide; 15 percent moderately hard angular sandstone.

The depth to soft bedrock ranges from 20 to 40 inches. The mollic epipedon is 20 to 30 inches thick and has 1 to 7 percent organic matter. The mean annual soil temperature ranges from 54 to 57 degrees F. The difference between mean summer and mean winter soil temperatures ranges from 4 to 9 degrees F. The soil between the depths of 6 and 17 inches is moist in all parts from November 1 to June 15. The moisture control section is dry in some or all parts from July 15 to October 1 in most years. Reaction is moderately acid or slightly acid throughout.

The A horizon has color of 10YR 4/1, 4/2, 5/1, 5/2, or 5/3. Moist color is 10YR 2/1, 2/2, 3/1, 3/2, or 3/3. The content of clay ranges from 15 to 25 percent. The content of very fine and fine, soft to moderately hard gravel ranges from 0 to 15 percent. Base saturation ranges from 65 to 85 percent.

The Bt horizon has color of 10YR 4/2, 5/2, or 5/3. Moist color is 10YR 2/2, 3/2, or 3/3. The texture is loam, clay loam, or sandy clay loam. The content of clay ranges from 18 to 35 percent. The content of moderately hard cobbles ranges from 0 to 5 percent. The total content of coarse fragments ranges from 0 to 15 percent. Base saturation ranges from 75 to 95 percent.

The BCt horizon, if it occurs, has color of 10YR 6/3, 6/4, 7/3, or 7/4. Moist color is 10YR 5/3, 5/4, or 5/6. The texture is gravelly sandy loam or gravelly loam. The content of clay ranges from 15 to 25 percent. The content of soft to moderately hard gravel ranges from 15 to 35 percent. In some pedons, uptilted strata of parent material extend into the lower part of the horizon. Base saturation ranges from 75 to 95 percent.

Aborigine Series

The Aborigine series (fig. 7) consists of very deep, very poorly drained soils that formed in marine sediments. These soils are on marine terraces. Slopes range from 0 to 5 percent. The mean annual precipitation is about 50 inches, and the mean annual air temperature is about 53 degrees F.

These soils are classified as clayey, mixed, isomesic Typic Albaquults.

Typical pedon of Aborigine sandy loam, in an area of Blacklock and Aborigine soils, 0 to 5 percent slopes; 350 feet north and 4,600 feet west of the southeast corner of sec. 3, T. 17 N., R. 17 W., MDBM, Comptche Southwest quadrangle:

Oi—3 inches to 0; fresh through decomposed litter of Mendocino cypress.

E—0 to 6 inches; variegated light gray (10YR 7/1) and white (N 8/0) sandy loam, light brownish gray (10YR 6/2) moist; massive; hard, friable, slightly sticky and nonplastic; common very fine, fine, and medium roots; common very fine and fine tubular and common very fine interstitial pores; slightly brittle when moist; slightly smeary; extremely acid (pH 4.4); clear wavy boundary.

EB—6 to 13 inches; very pale brown (10YR 7/3) loam, pale brown (10YR 6/3) moist; many fine and medium distinct brownish yellow (10YR 6/8) mottles, yellowish red (5YR 5/8) moist; weak fine and medium angular blocky and subangular

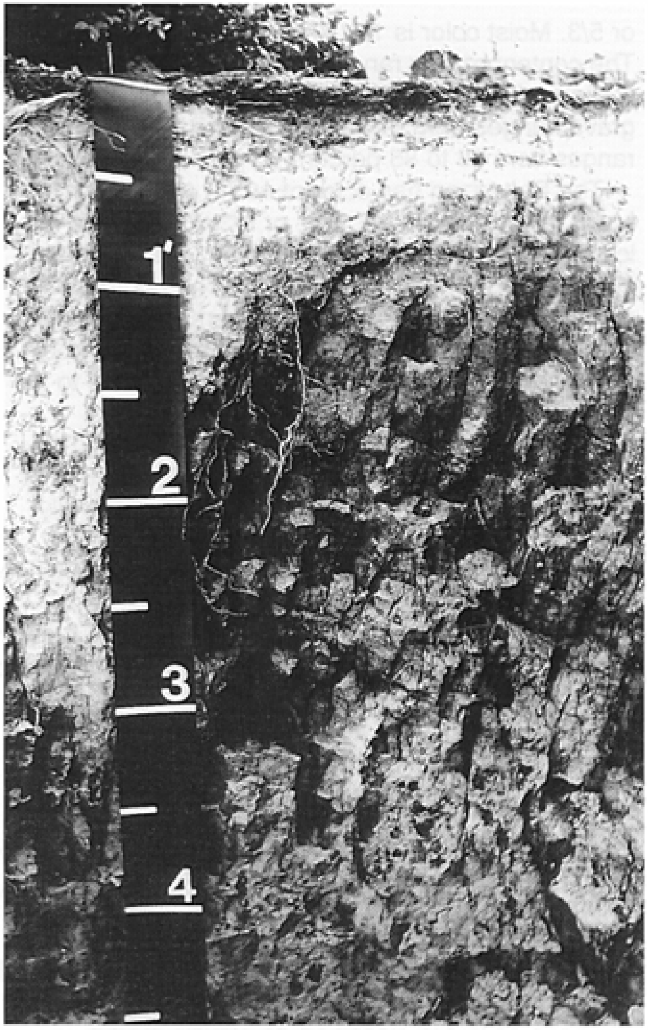

Figure 7.—A profile of Aborigine sandy loam. This soil supports stunted Mendocino cypress and bolander pine, known locally as pygmy forest. The dense subsoil of clay and sandy clay, which restricts penetration by roots and water, begins at a depth of about 10 inches. The albic horizon near the surface is extremely acid and has a low content of nutrients. Depth is marked in feet.

blocky structure; hard, firm, slightly sticky and slightly plastic; few very fine, fine, and medium roots; common very fine tubular pores; 3 percent hard rounded very dusky red (10R 2.5/2) nodules (5 to 10 millimeters); strongly acid (pH 5.5); abrupt wavy boundary.

2Btg1—13 to 34 inches; light gray (N 7/0) clay, light gray (10YR 7/1) moist; common medium and coarse prominent brownish yellow (10YR 6/8) and red (2.5YR 4/6) mottles, brownish yellow (10YR 6/8) and red (2.5YR 4/6) moist; strong coarse and very coarse prismatic structure parting to strong coarse angular blocky; ped faces are stained gray (10YR 5/1 and 6/1) with humic material; hard, firm, sticky and plastic; few very fine, fine, and medium roots that are confined to areas between peds; few very fine tubular pores; many moderately thick and thick clay films on faces of peds; extremely acid (pH 4.2); gradual wavy boundary.

3Btg2—34 to 46 inches; white (N 8/0) sandy clay, gray (10YR 6/1) moist; many coarse prominent red (10R 4/8) and common coarse prominent brownish yellow (10YR 6/8) mottles, red (2.5YR 4/6) and brownish yellow (10YR 6/8) moist; strong coarse prismatic structure parting to moderate coarse angular blocky; ped faces are stained gray (10YR 5/1 and 6/1) with humic material; hard, firm, sticky and plastic; few very fine tubular pores; many moderately thick and thick clay films on peds; extremely acid (pH 4.2); gradual wavy boundary.

3Btg3—46 to 55 inches; white (N 8/0) sandy clay, gray (10YR 6/1) moist; common coarse prominent red (10R 4/8) and brownish yellow (10YR 6/8) mottles, red (2.5YR 4/6) and brownish yellow (10YR 6/8) moist; moderate coarse angular blocky structure; extremely hard, firm, sticky and plastic; few very fine and fine roots that are confined to areas between peds; few very fine tubular pores; many moderately thick and thick clay films on faces of peds; extremely acid (pH 4.2); clear wavy boundary.

4Btg4—55 to 61 inches; gray (N 6/0) clay, gray (N 5/0) moist; common medium and coarse prominent brownish yellow (10YR 6/8) and red (10R 4/8) mottles, brownish yellow (10YR 6/8) and red (2.5YR 4/6) moist; weak coarse angular blocky structure; hard, firm, sticky and plastic; few very fine and fine roots that are confined to areas between peds; few very fine tubular pores; many moderately thick and thick clay films on faces of peds; extremely acid (pH 4.2).

The depth to bedrock is more than 60 inches. The mean annual soil temperature ranges from 50 to 56 degrees F. The difference between the mean summer and mean winter soil temperatures is 6 to 9 degrees F. The soil is saturated with water for long or very long periods following episodes of heavy rain from December through April. The saturated zone starts between the surface and a depth of 12 inches and extends to a depth of more than 60 inches. Reaction is extremely acid to strongly acid throughout.

The E horizon has color of 5Y 8/1 or 8/2; 10YR 7/1, 7/2, 7/3, or 8/1; or N 8/0. Moist color is 5Y 6/1 or 7/1 or 10YR 5/1, 6/1, 6/2, or 6/3. The content of clay

ranges from 5 to 10 percent. The content of hard nodules ranges from 0 to 5 percent.

The Btg horizon has color of N 6/0, 7/0, or 8/0 or 5Y 7/1 or 8/1. Moist color is N 5/0, 6/0, 7/0, or 8/0; 5Y 6/1 or 7/1; or 10YR 6/1 or 7/1. Mottles have dry color of 10YR 4/8, 6/8, or 7/8; 2.5YR 4/6; 5YR 6/6; or 10R 4/8. They have moist color of 10YR 5/8 or 6/8, 7.5YR 5/8, 5YR 5/8, or 2.5YR 4/6 or 5/6. Red mottles are typically surrounded by brownish yellow mottles. The texture of this horizon is clay loam, sandy clay, or clay that contains 35 to 55 percent clay. Base saturation is 2 to 10 percent.

Argixerolls

Argixerolls consist of very deep, well drained soils on dissected river terraces and terrace escarpments. These soils formed in alluvium derived from mixed rock sources. Slopes range from 0 to 50 percent. The mean annual precipitation is about 50 inches, and the mean annual air temperature is about 55 degrees F.

Reference pedon of Argixerolls, in an area of Xerochrepts-Haploxeralfs-Argixerolls complex, 9 to 30 percent slopes; 3,050 feet north and 200 feet west of the southeast corner of sec. 27, T. 22 N., R. 15 W., MDBM, Cahto Peak quadrangle:

Oi—1 inch to 0; litter of partially decomposed pine and Douglas-fir leaves and twigs.

A—0 to 10 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate very fine and fine subangular blocky structure; soft, friable, slightly sticky and slightly plastic; many very fine, fine, and medium roots; many very fine, fine, medium, and coarse interstitial and tubular pores; 3 percent hard subrounded gravel; neutral (pH 7.0); clear smooth boundary.

Bt1—10 to 16 inches; yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 4/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine, fine, and medium roots; many very fine, fine, and medium tubular pores; common thin clay films on faces of peds and lining pores; 5 percent hard subrounded gravel; slightly acid (pH 6.2); clear smooth boundary.

Bt2—16 to 30 inches; light yellowish brown (10YR 6/4) clay loam, dark brown (7.5YR 4/4) moist; strong fine and medium subangular blocky structure; hard, firm, sticky and plastic; many fine, medium, and coarse and common very fine roots; many very fine, fine, medium, and coarse tubular pores; many moderately thick clay films on faces of peds and lining pores; 5 percent hard subrounded gravel (2 to 25 millimeters); slightly acid (pH 6.2); gradual wavy boundary.

Bt3—30 to 45 inches; light yellowish brown (10YR 6/4) clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure parting to moderate fine subangular blocky; hard, firm, sticky and very plastic; common very fine, fine, medium, and coarse roots; common very fine, fine, medium, and coarse tubular pores; many moderately thick clay films on faces of peds and lining pores; 10 percent hard subrounded gravel; slightly acid (pH 6.5); gradual wavy boundary.

Bt4—45 to 62 inches; yellowish brown (10YR 5/4) clay loam, dark yellowish brown (10YR 4/4) moist; massive; hard, very friable, sticky and very plastic; few very fine and fine and common medium and coarse roots; few very fine, fine, and medium tubular pores; continuous moderately thick and thick clay films lining pores; 5 percent hard subrounded gravel; neutral (pH 6.8).

The depth to bedrock is more than 60 inches. The mollic epipedon is 10 to 15 inches thick and has 1 to 2 percent organic carbon. The mean annual soil temperature ranges from 55 to 59 degrees F. The soil between the depths of 6 and 18 inches is moist in all parts from November 1 through June 1. The moisture control section is dry in all parts from July 1 through October 1 in most years. Base saturation ranges from 50 to 80 percent. Reaction is slightly acid or neutral throughout.

The A horizon has color of 10YR 5/2 or 5/3 or 7.5YR 5/2 or 5/3. Moist color is 10YR 3/2 or 3/3 or 7.5YR 3/2 or 3/3. The content of clay ranges from 15 to 27 percent, and the content of gravel ranges from 2 to 15 percent.

The Bt horizon has color of 10YR 5/4, 5/6, 6/4, or 6/6 or 7.5YR 6/6 or 7/6. Moist color is 10YR 3/4, 4/4, or 5/4 or 7.5YR 4/4 or 4/6. The texture is loam, sandy loam, or clay loam that contains 20 to 35 percent clay and 5 to 15 percent gravel.

Bearwallow Series

The Bearwallow series consists of well drained soils that are moderately deep to weathered bedrock. These soils formed in material weathered from sandstone. They are on hills and mountains. Slopes range from 5 to 75 percent. The mean annual

precipitation is about 55 inches, and the mean annual air temperature is about 57 degrees F.

These soils are classified as fine-loamy, mixed, thermic Ultic Haploxeralfs.

Typical pedon of Bearwallow loam, in an area of Wolfey-Bearwallow complex, 30 to 50 percent slopes; 600 feet south and 600 feet east of the northwest corner of sec. 4, T. 13 N., R. 13 W., MDBM, Boonville Southeast quadrangle:

A—0 to 8 inches; pale brown (10YR 6/3) loam, dark brown (10YR 4/3) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; many very fine and common fine and medium tubular pores; moderately acid (pH 5.8); gradual wavy boundary.

Bt1—8 to 18 inches; pale brown (10YR 6/3) loam, dark brown (7.5YR 4/4) moist; weak fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few very fine and fine roots; common very fine interstitial and common very fine, fine, medium, and coarse tubular pores; few thin clay films lining pores; moderately acid (pH 5.8); gradual wavy boundary.

Bt2—18 to 26 inches; light yellowish brown (10YR 6/4) loam, variegated dark brown (7.5YR 4/4) and strong brown (7.5YR 5/6) moist; weak medium and coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine roots; few very fine interstitial and common very fine and fine and few medium and coarse tubular pores; common thin clay films lining pores; moderately acid (pH 5.6); gradual wavy boundary.

Bt3—26 to 34 inches; variegated light yellowish brown (10YR 6/4) and reddish yellow (7.5YR 6/6) loam, strong brown (7.5YR 5/6) moist; weak coarse subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine roots; few very fine interstitial and common very fine and fine and few medium and coarse tubular pores; common moderately thick clay films on faces of peds; strongly acid (pH 5.4); clear wavy boundary.

Crt—34 to 40 inches; fractured, medium grained, soft sandstone that slakes in water; fractures are less than 1 millimeter wide and 3 to 10 centimeters apart; continuous moderately thick clay films on fracture faces.

The depth to soft bedrock ranges from 20 to 40 inches. The mean annual soil temperature ranges from 59 to 62 degrees F. The soil between the depths of 6 and 18 inches is moist in all parts from November 1 to May 1 and is dry in all parts from June 15 to October 1 in most years. The content of gravel ranges from 0 to 15 percent throughout.

The A horizon has color of 10YR 6/3, 6/4, or 7/4 or 7.5YR 6/4. Moist color is 10YR 3/2, 3/3, 4/3, or 4/4 or 7.5YR 3/2, 4/2, or 4/4. The content of clay ranges from 15 to 25 percent. Base saturation ranges from 75 to 90 percent. Reaction is moderately acid or slightly acid.

The Bt horizon has color of 10YR 6/3, 6/4, 6/6, or 7/3 or 7.5YR 6/6 or 7/6. Moist color is 10YR 3/3, 4/4, or 5/6; 7.5YR 4/2, 4/4, 4/6, or 5/6; or 5YR 5/6. The texture is loam or clay loam that contains 20 to 35 percent clay. Base saturation ranges from 60 to 75 percent. Reaction is strongly acid or moderately acid.

Biaggi Series

The Biaggi series consists of well drained soils that are moderately deep to bedrock. These soils formed in material weathered from sandstone or shale. They are on marine terraces. Slopes range from 0 to 15 percent. The mean annual precipitation is about 40 inches, and the mean annual air temperature is about 53 degrees F.

These soils are classified as fine-loamy, mixed, isomesic Ustic Humitropepts.

Typical pedon of Biaggi loam, 0 to 5 percent slopes, 800 feet south and 2,100 feet west of the northeast corner of sec. 31, T. 13 N., R. 16 W., MDBM, Point Arena quadrangle:

A1—0 to 6 inches; brown (10YR 5/3) loam, very dark brown (10YR 2/2) moist; moderate very fine and fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular and interstitial pores; 2 percent hard subrounded gravel; very strongly acid (pH 5.0); clear wavy boundary.

A2—6 to 23 inches; brown (10YR 5/3) loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; many very fine tubular and interstitial pores; 5 percent hard subrounded gravel; very strongly acid (pH 4.8); abrupt wavy boundary.

R—23 to 25 inches; hard fractured sandstone.

The depth to hard bedrock ranges from 20 to 40 inches. The umbric epipedon is 20 to 40 inches thick and has 4 to 7 percent organic matter. The mean annual soil temperature ranges from 50 to 56 degrees F. The difference between the mean summer and mean winter soil temperatures ranges from 6 to 9

degrees F. The soil between the depths of 6 and 19 inches is moist in some or all parts from November 1 to June 1. The moisture control section is dry in some or all parts from July 1 to October 1 in most years. Base saturation ranges from 20 to 50 percent. Reaction ranges from very strongly acid to slightly acid.

The A horizon has color of 10YR 4/3 or 5/3. Moist color is 10YR 2/2, 3/2, or 3/3. The content of clay ranges from 18 to 27 percent. The content of gravel ranges from 0 to 15 percent.

Bigriver Series

The Bigriver series consists of very deep, well drained soils that formed in alluvium derived from sandstone. These soils are on flood plains. Slopes range from 0 to 5 percent. The mean annual precipitation is about 55 inches, and the mean annual air temperature is about 53 degrees F.

These soils are classified as coarse-loamy, mixed, nonacid, isomesic Typic Tropofluvents.

Typical pedon of Bigriver loamy sand, 0 to 5 percent slopes, 2,050 feet south and 1,150 feet west of the northeast corner of sec. 11, T. 15 N., R. 17 W., MDBM, Elk quadrangle:

A—0 to 6 inches; variegated pale brown (10YR 6/3) and very pale brown (10YR 7/3) loamy sand, dark brown, brown, and brownish yellow (10YR 3/3, 5/3, and 6/6) moist; massive; loose, nonsticky and nonplastic; few very fine and fine roots; many very fine interstitial pores; slightly acid (pH 6.3); abrupt smooth boundary.

Ab—6 to 8 inches; variegated brown (10YR 5/3) and yellowish brown (10YR 5/4) sandy loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and few medium roots; common very fine and fine interstitial and few fine tubular pores; slightly acid (pH 6.4); abrupt wavy boundary.

C—8 to 10 inches; variegated pale brown (10YR 6/3) and very pale brown (10YR 7/3) loamy sand, dark brown (10YR 3/3 and 4/3) moist; weak fine and medium subangular blocky structure; soft, loose, nonsticky and nonplastic; few very fine and fine roots; many very fine interstitial pores; slightly acid (pH 6.3); abrupt wavy boundary.

A´b—10 to 12 inches; variegated brown (10YR 5/3) and light yellowish brown (10YR 6/4) loam, dark brown (10YR 3/3 and 4/3) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine and few medium roots; common very fine and fine interstitial pores; slightly acid (pH 6.3); abrupt smooth boundary.

C´—12 to 17 inches; variegated pale brown (10YR 6/3) and very pale brown (10YR 7/4) sandy loam, variegated brown (10YR 5/3) and yellowish brown (10YR 5/4) moist; moderate thin platy structure; soft, very friable, slightly sticky and slightly plastic; few very fine and fine roots; many very fine and fine interstitial pores; slightly acid (pH 6.3); abrupt smooth boundary.

A´´b1—17 to 25 inches; variegated brown (10YR 5/3) and light yellowish brown (10YR 6/4) loam, very dark grayish brown (10YR 3/2) and dark grayish brown (10YR 4/2) moist; moderate fine and medium subangular blocky structure; hard, friable, slightly sticky and plastic; common fine, medium, and coarse roots; many very fine, fine, and medium tubular and few very fine interstitial pores; slightly acid (pH 6.3); gradual irregular boundary.

A´´b2—25 to 44 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; strong fine and medium subangular blocky structure; hard, friable, slightly sticky and plastic; common fine, medium, and coarse roots; many very fine and common fine and medium tubular and few very fine interstitial pores; slightly acid (pH 6.3); abrupt smooth boundary.

C´´1—44 to 54 inches; variegated brown (10YR 5/3) and pale brown (10YR 6/3) sandy loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few medium and coarse roots; common very fine and fine interstitial pores; slightly acid (pH 6.3); abrupt smooth boundary.

C´´2—54 to 63 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few medium and coarse roots; common very fine and few fine interstitial pores; slightly acid (pH 6.3).

The depth to bedrock is more than 60 inches. The mean annual soil temperature ranges from 50 to 54 degrees F. The difference between the mean summer and mean winter soil temperatures ranges from 3 to 6 degrees F. The soil between the depths of 11 and 24 inches is moist in all parts from November 1 to August 15 and is dry in some part from September 1 to October 15 in most years. These soils are frequently flooded for brief periods from December

through April. Reaction is moderately acid or slightly acid throughout.

The A horizon has color of 10YR 5/3, 5/4, 6/3, 6/4, or 7/3. Moist color is 10YR 3/3, 4/3, 5/3, or 6/6. The content of clay ranges from 5 to 10 percent.

The C horizon has color of 10YR 5/2, 5/3, 5/4, 6/3, 6/4, 7/3, or 7/4. Moist color is 10YR 3/2, 3/3, 4/2, 4/3, 5/3, or 5/4. The texture is stratified loamy sand, sandy loam, loam, and silt loam. The content of clay ranges from 5 to 18 percent.

Blacklock Series

The Blacklock series consists of very poorly drained soils that are shallow to a hardpan. These soils formed in marine sediments. They are on marine terraces. Slopes range from 0 to 5 percent. The mean annual precipitation is about 50 inches, and the mean annual air temperature is about 53 degrees F.

These soils are classified as sandy, mixed, isomesic, ortstein and shallow Typic Duraquods.

Typical pedon of Blacklock loamy sand, in an area of Blacklock and Aborigine soils, 0 to 5 percent slopes; 300 feet north and 1,750 feet west of the southeast corner of sec. 32, T. 18 N., R. 17 W., MDBM, Mendocino quadrangle:

Oi—1/2 inch to 0; litter of Mendocino cypress and California huckleberry.

AE—0 to 7 inches; gray (10YR 6/1) loamy sand, dark gray (10YR 4/1) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and common fine and medium roots; many very fine and fine interstitial pores; extremely acid (pH 3.9); clear wavy boundary.

E—7 to 13 inches; white (10YR 8/1) sandy loam, light brownish gray (10YR 6/2) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; slightly brittle when moist; slightly smeary; few very fine and fine roots; many very fine and fine interstitial pores; extremely acid (pH 4.4); clear wavy boundary.

BA—13 to 14 inches; brown (7.5YR 5/2) sandy loam, dark brown (7.5YR 3/2) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; many very fine and fine interstitial pores; extremely acid (pH 4.0); abrupt wavy boundary.

Bsm1—14 to 29 inches; reddish yellow (7.5YR 6/6) and strong brown (7.5YR 5/8), weakly cemented duripan, brown (7.5YR 4/4) and yellowish brown (10YR 5/8) moist; common fine distinct very pale brown (10YR 7/4) mottles, light yellowish brown (10YR 6/4) moist; weak medium platy structure; hard, nonsticky and nonplastic; few very fine roots; few very fine interstitial pores; very strongly acid (pH 5.0); clear irregular boundary.

Bsm2—29 to 36 inches; very pale brown (10YR 7/4), strongly cemented duripan, yellowish brown (10YR 5/6) moist; common fine and medium distinct strong brown (7.5YR 5/8), reddish yellow (7.5YR 6/6), and yellowish red (5YR 5/6) mottles, strong brown (7.5YR 5/6) and reddish brown (5YR 4/4) moist; weak medium platy structure; very hard, extremely firm, nonsticky and nonplastic; few very fine roots; few very fine and fine pores; very strongly acid (pH 4.9); gradual wavy boundary.

Btm—36 to 61 inches; yellow (10YR 7/6), strongly cemented duripan, strong brown (7.5YR 5/8) moist; many fine and medium prominent reddish brown (5YR 4/3) mottles, dark reddish brown (5YR 3/2) moist; moderate thick platy structure; very hard, extremely firm, nonsticky and nonplastic; few very fine roots; continuous thin and moderately thick clay films on faces of peds; strongly acid (pH 5.2); abrupt wavy boundary.

C—61 to 64 inches; very pale brown (10YR 7/4) loamy sand, strong brown (7.5YR 5/6) moist; common fine prominent yellowish red (5YR 5/8) mottles, dark reddish brown (2.5YR 3/4) moist; massive; very hard, very firm, nonsticky and nonplastic; strongly acid (pH 5.1).

The depth to bedrock is more than 80 inches. The depth to the hardpan (ortstein) ranges from 12 to 20 inches. The mean annual soil temperature ranges from 50 to 56 degrees F. The difference between the mean winter and mean summer soil temperatures ranges from 6 to 9 degrees F. The soil is saturated with water for long or very long periods from December through April. The saturated zone starts at the surface and extends to the top of the hardpan. The soil is also saturated beneath the hardpan for long or very long periods. Base saturation ranges from 1 to 20 percent throughout.

The AE horizon has color of 10YR 5/1 or 6/1. Moist color is 10YR 3/1 or 4/1. The content of clay ranges from 1 to 10 percent.

The E horizon has color of 10YR 6/2, 7/1, 7/2, or 8/1. Moist color is 10YR 5/2 or 6/2. The texture is sandy loam or loamy sand that contains 2 to 12 percent clay. Consistence is slightly or moderately brittle when moist and is slightly or moderately smeary.

The Bm horizon has color of 10YR 7/4, 7/6, or 8/4 or 7.5YR 5/6, 5/8, 6/6, or 6/8. Moist color is 10YR 5/6, 5/8, or 6/4 or 7.5YR 4/4 or 4/6. Mottles have dry color of 2.5Y 7/4; 10YR 6/8, 7/4, or 7/6; 7.5YR 4/4,

5/8, or 6/6; or 5YR 3/4, 4/3, 4/6, or 5/6 and moist color of 2.5Y 6/4; 10YR 6/4 or 6/6; 7.5YR 3/4, 4/6, or 5/6; or 5YR 3/2, 3/3, 3/4, or 4/4. The content of clay ranges from 5 to 15 percent. Cementation is weak to strong. Reaction is very strongly acid or strongly acid.

The C horizon has color of 10YR 7/4 or 7.5YR 6/6 or 7/6. Moist color is 10YR 5/6 or 7.5YR 5/6 or 5/8. Mottles have dry color of 10YR 7/6 or 5YR 4/6 or 5/8 and moist color of 10YR 6/6, 5YR 3/4, or 2.5YR 3/4. The texture of this horizon is loamy sand or sand. The content of clay ranges from 1 to 10 percent.

Boontling Series

The Boontling series consists of very deep, somewhat poorly drained soils that formed in alluvium derived from mixed rock sources. These soils are on river terrace platforms and associated scarps. Slopes range from 2 to 30 percent. The mean annual precipitation is about 45 inches, and the mean annual air temperature is about 56 degrees F.

These soils are classified as fine-loamy, mixed, thermic Ultic Argixerolls.

Typical pedon of Boontling loam, 2 to 9 percent slopes, 2,000 feet south and 1,400 feet east of the northwest corner of sec. 35, T. 14 N., R. 14 W., MDBM, Boonville Southwest quadrangle:

Ap—0 to 6 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine and fine tubular and interstitial pores; moderately acid (pH 5.8); clear wavy boundary.

A—6 to 12 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate fine, medium, and coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine and fine tubular and interstitial pores; moderately acid (pH 5.8); gradual wavy boundary.

Bt1—12 to 23 inches; pale brown (10YR 6/3) loam, dark brown (10YR 3/3) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine and fine tubular and interstitial pores; common moderately thick and thick clay films on faces of peds and lining pores; 5 percent hard subrounded gravel; slightly acid (pH 6.4); clear wavy boundary.

Bt2—23 to 30 inches; very pale brown (10YR 7/3) loam, brown (10YR 5/3) moist; common fine and medium distinct brownish yellow (10YR 6/6) mottles, dark yellowish brown (10YR 4/6) moist; moderate fine and medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine and fine tubular and interstitial pores; common moderately thick and thick clay films on faces of peds and lining pores; 10 percent soft subrounded gravel (2 to 15 millimeters); neutral (pH 6.8); clear wavy boundary.

Bt3—30 to 40 inches; light yellowish brown (2.5Y 6/4) clay loam, olive brown (2.5Y 4/4) moist; common fine distinct light gray (2.5Y 7/2) and many medium prominent brownish yellow (10YR 6/6) mottles, grayish brown (2.5Y 5/2) and dark yellowish brown (10YR 4/6) moist; strong fine, medium, and coarse subangular blocky structure; very hard, firm, sticky and plastic; few very fine roots; few very fine and fine tubular and interstitial pores; many moderately thick and thick clay films on faces of peds and lining pores; 10 percent soft subrounded gravel; neutral (pH 7.0); clear wavy boundary.

Bt4—40 to 60 inches; light yellowish brown (10YR 6/4) gravelly clay loam, olive brown (2.5Y 4/4) moist; common fine distinct light gray (2.5Y 7/2) and many fine and medium faint brownish yellow (10YR 6/6) mottles, grayish brown (2.5Y 5/2) and dark yellowish brown (10YR 4/6) moist; strong medium and coarse subangular blocky structure; very hard, very firm, sticky and plastic; few very fine roots; few very fine and fine tubular and interstitial pores; continuous moderately thick and thick clay films on faces of peds and lining pores; 15 percent soft to hard subrounded gravel and 5 percent hard subrounded cobbles; neutral (pH 7.2).

The depth to bedrock is more than 60 inches. The mollic epipedon is 10 to 20 inches thick and has 1 to 4 percent organic matter. The mean annual soil temperature ranges from 59 to 62 degrees F. The soil between the depths of 6 and 19 inches is moist in all parts from November 1 to June 15 and is dry in all parts from August 1 to October 1 in most years. The soil is saturated with water for brief or long periods following episodes of heavy rain from December through May. The saturated zone starts between the depths of 30 and 40 inches and extends to a depth of more than 60 inches. The soil is not saturated above a depth of 60 inches from summer through early fall.

The A horizon has color of 10YR 4/2, 5/2, or 5/3. Moist color is 10YR 2/2, 3/2, or 3/3. The content of clay ranges from 18 to 25 percent. Base saturation

ranges from 50 to 75 percent. Reaction is moderately acid or slightly acid.

The Bt horizon has color of 2.5Y 6/4 or 10YR 5/4, 6/3, 6/4, 7/2, or 7/3. Moist color is 2.5Y 4/4, 5/4, or 6/4 or 10YR 3/3, 4/2, 4/3, 5/2, 5/3, 5/4, 6/2, 6/3, or 6/4. Mottles have dry color of 2.5Y 6/2 or 7/2 or 10YR 6/4, 6/6, or 6/8 and moist color of 2.5Y 5/2 or 10YR 4/6, 5/4, 5/6, or 5/8. The texture of this horizon is loam, silt loam, silty clay loam, clay loam, clay, gravelly sandy clay loam, or gravelly clay loam. The content of clay ranges from 22 to 27 percent in the upper part and from 22 to 45 percent in the lower part. The content of gravel ranges from 0 to 35 percent. The content of cobbles ranges from 0 to 10 percent. Gravelly textures, if they occur, are typically below a depth of 40 inches. Base saturation ranges from 75 to 90 percent. Reaction ranges from moderately acid to neutral.

Branscomb Series

The Branscomb series consists of well drained soils that are deep to bedrock. These soils formed in material weathered from sandstone. They are on mountains. Slopes range from 30 to 99 percent. The mean annual precipitation is about 50 inches, and the mean annual air temperature is about 53 degrees F.

These soils are classified as loamy-skeletal, mixed, isomesic Ultic Hapludalfs.

Typical pedon of Branscomb very gravelly loam, in an area of Branscomb-Usal complex, 50 to 75 percent slopes; 1,300 feet south and 100 feet east of the northwest corner of sec. 12, T. 19 N., R. 17 W., MDBM, Dutchman's Knoll quadrangle:

Oi—2 inches to 0; litter of redwood, Douglas-fir, and tanoak.

A—0 to 10 inches; grayish brown (10YR 5/2) very gravelly loam, very dark brown (10YR 2/2) moist; strong fine and medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; few very fine and common fine, medium, and coarse roots; many very fine and fine interstitial and few very fine tubular pores; 40 percent gravel; strongly acid (pH 5.5); clear wavy boundary.

Bt1—10 to 16 inches; pale brown (10YR 6/3) very gravelly loam, dark brown (10YR 3/3) moist; strong fine and medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; few very fine and common fine and medium roots; few very fine and fine tubular and common very fine and fine interstitial pores; common thin clay films on faces of peds; 35 percent gravel, 5 percent angular cobbles; moderately acid (pH 6.0); gradual wavy boundary.

Bt2—16 to 25 inches; very pale brown (10YR 7/3) very gravelly clay loam, dark yellowish brown (10YR 4/4) moist; moderate fine and medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine and common fine, medium, and coarse roots; few very fine tubular and common very fine and fine interstitial pores; common thin clay films on faces of peds and lining pores; 30 percent gravel, 5 percent angular cobbles; very strongly acid (pH 4.5); gradual wavy boundary.

Bt3—25 to 50 inches; very pale brown (10YR 7/4) very gravelly loam, yellowish brown (10YR 5/4) moist; moderate fine, medium, and coarse angular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine and medium roots; few very fine and fine interstitial pores; many moderately thick clay films on faces of peds and common thin clay films lining pores; 50 percent gravel, 5 percent angular cobbles; very strongly acid (pH 4.5); abrupt wavy boundary.

R—50 to 55 inches; hard, fractured sandstone; fractures are 5 to 20 millimeters apart and 1 to 2 millimeters wide.

The depth to hard bedrock ranges from 40 to 60 inches. The mean annual soil temperature is 51 to 56 degrees F. The difference between the mean winter and mean summer soil temperatures ranges from 3 to 6 degrees F. The soil between the depths of 11 and 33 inches is moist in all parts from November 1 to August 1 and is dry in some part from September 1 to October 1 in most years.

The A horizon has color of 10YR 4/2, 5/2, or 5/3. Moist color is 10YR 2/2, 3/3, 4/3, 4/4, or 5/4. The content of clay ranges from 15 to 27 percent. The content of gravel ranges from 35 to 45 percent. Base saturation ranges from 50 to 75 percent. Reaction is strongly acid or moderately acid.

The Bt horizon has color of 10YR 6/3, 6/4, 7/3, or 7/4. Moist color is 10YR 3/3, 4/3, 4/4, or 5/4. The texture is very gravelly loam or very gravelly clay loam. The content of clay ranges from 20 to 35 percent. The content of coarse fragments ranges from 35 to 60 percent. Base saturation ranges from 40 to 60 percent. Reaction is very strongly acid to moderately acid.

Bruhel Series

The Bruhel series consists of well drained soils that are deep or very deep to weathered bedrock. These soils formed in material weathered from sandstone. They are on coastal hills and mountains and associated marine terraces. Slopes range from 2 to 75 percent. The mean annual precipitation is about 45 inches, and the mean annual air temperature is about 53 degrees F.

These soils are classified as fine-loamy, mixed, isomesic Pachic Argiustolls.

Typical pedon of Bruhel loam, in an area of Abalobadiah-Bruhel-Vizcaino complex, 50 to 75 percent slopes; 950 feet south and 1,500 feet west of the northeast corner of sec. 20, T. 20 N., R. 17 W., Inglenook quadrangle:

A—0 to 4 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine, medium, and coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular and interstitial and few fine tubular pores; 5 percent soft to hard subangular gravel; moderately acid (pH 5.6); clear wavy boundary.

Bt1—4 to 16 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; strong medium and coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and few fine and medium roots; common very fine tubular and interstitial pores; few thin clay films lining pores; moderately acid (pH 5.8); clear wavy boundary.

Bt2—16 to 21 inches; grayish brown (10YR 5/2) clay loam, dark brown (10YR 3/3) moist; moderate medium and coarse angular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; common very fine roots; many very fine tubular and interstitial and few fine tubular pores; common thin clay films lining pores; moderately acid (pH 5.8); abrupt wavy boundary.

Bt3—21 to 26 inches; brown (10YR 5/3) gravelly clay loam, dark brown (10YR 3/3) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; many very fine tubular and interstitial and few fine tubular pores; common thin clay films on faces of peds and lining pores; 20 percent soft to hard subangular gravel (2 to 10 millimeters); moderately acid (pH 5.8); clear wavy boundary.

BCt—26 to 41 inches; pale brown (10YR 6/3) gravelly loam, brown (7.5YR 4/4) moist; strong fine and medium subangular blocky and angular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; many very fine tubular and interstitial and few fine tubular pores; common thin and few moderately thick clay films on faces of peds; 20 percent soft to hard subrounded gravel; moderately acid (pH 5.8); clear wavy boundary.

Crt1—41 to 45 inches; fractured soft sandstone; fractures are 2 to 5 millimeters wide and are 1 to 5 centimeters apart; few very fine roots in fractures; many moderately thick clay films and common black (10YR 2/1) stains on fracture faces; about 15 percent of horizon is hard angular sandstone; about 10 percent is soil material filling fractures; clear wavy boundary.

Crt2—45 to 55 inches; fractured soft and moderately hard sandstone; fractures are less than 1 millimeter wide and are 5 to 20 centimeters apart; lesser fractures are 1 to 2 centimeters apart; few very fine roots in fractures; many moderately thick clay films on fracture faces; about 10 percent of horizon is hard angular sandstone.

The depth to soft bedrock ranges from 40 to 70 inches. The thickness of the mollic epipedon ranges from 20 to 50 inches. The content of organic matter in the mollic epipedon ranges from 1 to 7 percent. The mean annual soil temperature ranges from 54 to 57 degrees F. The difference between the mean summer and mean winter soil temperatures ranges from 4 to 9 degrees F. The soil between the depths of 6 and 17 inches is moist in all parts from November 1 to June 15 and is dry in some or all parts from July 15 to October 1 in most years. Reaction is moderately acid or slightly acid throughout.

The A horizon has color of 10YR 4/1, 4/2, 5/1, 5/2, or 5/3. Moist color is 10YR 2/1, 2/2, 3/1, 3/2, or 3/3. The content of clay ranges from 15 to 27 percent. The content of gravel ranges from 0 to 15 percent. Base saturation ranges from 70 to 80 percent.

The upper part of the Bt horizon has color of 10YR 4/2, 5/2, or 5/3. Moist color is 10YR 2/2, 3/2, or 3/3. The lower part of this horizon has color of 10YR 6/3, 6/4, 7/3, 7/4, or 7/6. Moist color is 10YR 4/3, 4/4, 5/3, or 5/6 or 7.5YR 4/4. The texture of this horizon is loam, clay loam, or sandy clay loam or the gravelly analogs of these textures. The content of clay ranges from 20 to 35 percent. The content of gravel ranges from 0 to 35 percent and generally increases with depth. Base saturation ranges from 75 to 95 percent.

Cabrillo Series

The Cabrillo series consists of very deep, somewhat poorly drained soils that formed in marine sediments. These soils are on marine terraces. Slopes range from 0 to 5 percent. The mean annual precipitation is about 40 inches, and the mean annual air temperature is about 53 degrees F.

These soils are classified as fine-loamy, mixed, isomesic Ultic Haplustalfs.

Typical pedon of Cabrillo sandy loam, in an area of Cabrillo-Heeser complex, 0 to 5 percent slopes; 1,900 feet north and 4,200 feet west of the southeast corner of sec. 12, T. 17 N., R. 18 W., MDBM, Mendocino quadrangle:

A1—0 to 6 inches; dark grayish brown (10YR 4/2) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many very fine interstitial pores; very strongly acid (pH 5.0); gradual smooth boundary.

A2—6 to 16 inches; dark brown (10YR 3/3) sandy loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine roots; many very fine tubular and interstitial pores; very strongly acid (pH 4.9); clear wavy boundary.

ABt—16 to 26 inches; variegated dark grayish brown (10YR 4/2) and light yellowish brown (10YR 6/4) sandy loam, very dark grayish brown (10YR 3/2) and brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; many very fine tubular and interstitial pores; few thin clay films bridging sand grains; strongly acid (pH 5.1); clear wavy boundary.

Bt—26 to 35 inches; very pale brown (10YR 7/4) sandy clay loam, yellowish brown (10YR 5/4) moist; common medium distinct yellowish brown (10YR 5/6) mottles, yellowish brown (10YR 5/6) moist; weak medium subangular blocky structure; slightly hard, friable, sticky and plastic; few very fine roots; common very fine tubular pores; many thin and moderately thick clay films on faces of peds and lining pores; strongly acid (pH 5.1); clear wavy boundary.

Btg—35 to 50 inches; light gray (2.5Y 7/2) sandy clay loam, light brownish gray (2.5Y 6/2) moist; many medium and coarse prominent strong brown (7.5YR 5/8) mottles, strong brown (7.5YR 5/8) moist; weak medium subangular blocky structure; slightly hard, friable, sticky and plastic; few very fine roots; common very fine tubular pores; many thin and moderately thick clay films bridging sand grains; very strongly acid (pH 5.0); clear wavy boundary.

Cg—50 to 60 inches; light gray (2.5Y 7/2) loamy sand, light brownish gray (2.5Y 6/2) moist; many fine and medium prominent yellowish red (5YR 5/8) mottles, yellowish red (5YR 5/8) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine interstitial pores; strongly acid (pH 5.2).

The depth to bedrock is more than 60 inches. The umbric epipedon is 10 to 20 inches thick and has 3 to 8 percent organic matter. The mean annual soil temperature is 50 to 56 degrees F. The difference between the mean summer and mean winter soil temperatures ranges from 6 to 9 degrees F. The soil between the depths of 8 and 25 inches is moist in all parts from November 1 to June 1 and is dry in some or all parts from July 1 to October 1 in most years. The soil is saturated with water for brief or long periods following episodes of heavy rain from December through April. The saturated zone starts between the depths of 30 and 48 inches and extends to a depth of more than 60 inches. The soil is not saturated above a depth of 60 inches from summer through early fall. Reaction ranges from very strongly acid to moderately acid throughout.

The A horizon has color of 10YR 3/3, 4/1, 4/2, 4/3, 5/2, or 5/3. Moist color is 10YR 2/1, 2/2, 3/1, 3/2, or 3/3. The content of clay ranges from 8 to 20 percent. Base saturation ranges from 10 to 40 percent.

The Bt horizon has color of 2.5Y 6/4, 7/2, or 7/4 or 10YR 6/3, 6/4, 7/3, or 7/4. Moist color is 2.5Y 5/4, 6/2, 6/4, or 7/2 or 10YR 4/3, 5/3, 5/4, or 6/4. Mottles have dry color of 2.5Y 6/2 or 7/2, 10YR 5/6 or 6/2, 7.5YR 5/8, or 5YR 5/8 and moist color of 2.5Y 6/2 or 5/2, 10YR 5/2 or 5/6, 7.5YR 5/8, or 5YR 5/8. Matrix or mottle colors with chroma of 2 are between the depths of 30 and 50 inches. The texture of the Bt horizon is sandy clay loam or sandy clay. The content of clay ranges from 20 to 40 percent. Base saturation ranges from 20 to 40 percent.

The C horizon has color of 2.5Y 6/2, 6/4, 6/6, or 7/2 or 10YR 6/4 or 6/6. Moist color is 2.5Y 6/2, 6/4, or 5/4 or 10YR 5/4 or 5/6. Mottles have dry and moist color of 7.5YR 5/8 or 5YR 5/8. The texture of this horizon is sandy loam or loamy sand. The content of clay ranges from 8 to 20 percent. Base saturation ranges from 35 to 50 percent.

Carlain Series

The Carlain series consists of very deep, well drained soils that formed in alluvium derived from sandstone. These soils are on narrow river terraces. Slopes range from 2 to 9 percent. The mean annual precipitation is about 50 inches, and the mean annual air temperature is about 53 degrees F.

These soils are classified as fine-loamy, mixed, isomesic Ultic Hapludalfs.

Typical pedon of Carlain loam, 2 to 9 percent slopes, 1,625 feet south and 1,675 feet east of the northwest corner of sec. 10, T. 17 N., R. 15 W., MDBM, Comptche Southeast quadrangle:

Oi—1 inch to 0; litter of redwood and Douglas-fir.

A—0 to 5 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; strong fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common medium and few fine roots; few fine tubular and many fine interstitial pores; 5 percent hard rounded gravel; strongly acid (pH 5.4); clear wavy boundary.

Bt1—5 to 12 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; strong fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine, medium, and coarse roots; many fine and common medium interstitial and few medium tubular pores; few thin clay films on faces of peds and lining pores; 5 percent hard rounded gravel; strongly acid (pH 5.2); clear wavy boundary.

Bt2—12 to 19 inches; very pale brown (10YR 7/3) loam, yellowish brown (10YR 5/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine, medium, and coarse roots; many fine and common medium interstitial and few medium tubular pores; common thin clay films on faces of peds and lining pores; few thin clay films bridging mineral grains; 5 percent hard rounded gravel; strongly acid (pH 5.3); clear wavy boundary.

Bt3—19 to 29 inches; very pale brown (10YR 7/4) loam, light yellowish brown (10YR 6/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine, medium, and coarse roots; many fine and common medium interstitial and few fine and medium tubular pores; many moderately thick clay films on faces of peds and lining pores; common thin clay films bridging mineral grains; 10 percent hard rounded gravel; strongly acid (pH 5.1); abrupt smooth boundary.

2Bt4—29 to 45 inches; light brown (7.5YR 6/4) extremely gravelly clay loam, strong brown (7.5YR 4/6) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine tubular and interstitial pores; continuous thick clay films on gravel; 70 percent hard rounded gravel and 10 percent hard rounded cobbles; strongly acid (pH 5.3); gradual wavy boundary.

2Bt5—45 to 61 inches; light brown (7.5YR 6/4) extremely gravelly loam, brown (7.5YR 4/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine tubular and common very fine interstitial pores; many moderately thick clay films on gravel; 65 percent hard rounded gravel and 5 percent hard rounded cobbles; strongly acid (pH 5.3).

The depth to bedrock is more than 60 inches. The mean annual soil temperature ranges from 50 to 55 degrees F. The difference between the mean summer and mean winter soil temperatures ranges from 3 to 9 degrees F. The soil between the depths of 8 and 19 inches is moist in all parts from November 1 to August 15 and is dry in some part from September 1 to October 1 in most years.

The A horizon has color of 10YR 5/6, 6/2, 6/3, or 6/4. Moist color is 10YR 4/2, 4/3, 4/4, or 4/6. The content of clay ranges from 10 to 20 percent. The content of gravel ranges from 0 to 10 percent. Base saturation ranges from 60 to 75 percent. Reaction is strongly acid to slightly acid.

The Bt horizon has color of 10YR 6/3, 6/4, 7/3, or 7/4 or 7.5YR 6/4. Moist color is 10YR 5/3, 5/4, 5/6, or 6/4 or 7.5YR 4/4 or 4/6. The texture is loam, sandy clay loam, clay loam, gravelly loam, gravelly sandy clay loam, or gravelly clay loam. The content of clay ranges from 18 to 32 percent. The content of coarse fragments ranges from 2 to 35 percent.

The 2Bt horizon has the same colors as the Bt horizon. The 2Bt horizon is stratified very gravelly or extremely gravelly loam, sandy loam, clay loam, and sandy clay loam. The content of clay ranges from 15 to 30 percent. The content of coarse fragments ranges from 35 to 80 percent. Base saturation (sum) ranges from 35 to 60 percent. Reaction is strongly acid or moderately acid.

Casabonne Series

The Casabonne series consists of well drained soils that are deep to bedrock. These soils formed in material weathered from sandstone or shale. They are on hills and mountains. Slopes range from 9 to 75 percent. The mean annual precipitation is about 60 inches, and the mean annual air temperature is about 55 degrees F.

These soils are classified as fine-loamy, mixed, mesic Ultic Haploxeralfs.

Typical pedon of Casabonne gravelly loam, in an area of Pardaloe-Woodin-Casabonne complex, 30 to 50 percent slopes; 2,500 feet south and 3,750 feet west of the northeast corner of sec. 14, T. 12 N., R. 14 W., MDBM, Ornbaun Valley Northwest quadrangle:

Oi—$^{1}/_{2}$ inch to 0; litter of Douglas-fir and tanoak leaves and twigs.

A1—0 to 4 inches; brown (7.5YR 4/4) gravelly loam, dark reddish brown (5YR 3/4) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine and few medium and coarse roots; many very fine tubular and interstitial pores; 20 percent gravel; strongly acid (pH 5.4); clear wavy boundary.

A2—4 to 11 inches; brown (7.5YR 4/4) gravelly loam, dark reddish brown (5YR 3/4) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine and few medium and coarse roots; many very fine tubular and interstitial pores; 25 percent gravel; strongly acid (pH 5.4); gradual wavy boundary.

Bt1—11 to 26 inches; brown (7.5YR 5/4) clay loam, reddish brown (5YR 4/4) moist; weak medium subangular blocky structure; hard, friable, sticky and plastic; few very fine and fine and common medium and coarse roots; many very fine and few fine and medium tubular and interstitial pores; few thin clay films on faces of peds and lining pores; 10 percent gravel; strongly acid (pH 5.2); gradual wavy boundary.

Bt2—26 to 36 inches; brown (7.5YR 5/4) clay loam, reddish brown (5YR 4/4) moist; weak fine and medium subangular blocky structure; hard, firm, sticky and plastic; few very fine, fine, medium, and coarse roots; many very fine and few fine, medium, and coarse tubular and interstitial pores; common thin and moderately thick clay films on faces of peds and lining pores; 10 percent gravel; strongly acid (pH 5.2); abrupt smooth boundary.

Bt3—36 to 49 inches; reddish yellow (7.5YR 6/6) gravelly clay loam, reddish brown (7.5YR 4/4) moist; moderate medium angular blocky structure; hard, firm, sticky and plastic; common medium and coarse roots; many very fine and fine tubular and interstitial pores; many moderately thick clay films on faces of peds and lining pores; 20 percent gravel; strongly acid (pH 5.2); abrupt irregular boundary.

R—49 to 58 inches; hard, fractured sandstone; fractures are 2.5 to 10 centimeters apart and less than 1 millimeter wide; common medium and coarse roots along fractures; continuous moderately thick clay films on fracture faces; rock does not slake in water.

The depth to hard bedrock ranges from 40 to 60 inches. The mean annual soil temperature ranges from 54 to 59 degrees F. The soil between the depths of 8 and 20 inches is moist in all parts from November 1 to May 15 and is dry in all parts from July 1 to October 1 in most years. The content of gravel ranges from 5 to 25 percent throughout. Reaction ranges from strongly acid to slightly acid throughout.

The A horizon has color of 10YR 5/3, 6/3, or 6/4 or 7.5YR 4/4, 5/4, 5/6, 6/6, or 7/6. Moist color is 10YR 4/4, 7.5YR 4/4 or 5/6, or 5YR 3/4. The texture is loam or gravelly loam. The content of clay ranges from 15 to 27 percent. Base saturation ranges from 15 to 50 percent.

The Bt horizon has color of 7.5YR 4/4, 5/4, 6/4, 6/6, or 7/4 or 5YR 5/6, 6/6, or 7/6. Moist color is 7.5YR 4/4 or 5/6 or 5YR 3/4, 4/4, 4/6, or 5/6. The texture is clay loam, sandy clay loam, gravelly sandy clay loam, or gravelly clay loam. The content of clay ranges from 27 to 35 percent. Base saturation ranges from 35 to 50 percent.

Caspar Series

The Caspar series consists of very deep, well drained soils that formed in marine sediments. These soils are on marine terraces. Slopes range from 2 to 50 percent. The mean annual precipitation is about 50 inches, and the mean annual air temperature is about 53 degrees F.

The Caspar soils in this survey area are taxadjuncts because they have a clay decrease of 20 percent or more within a depth of 60 inches. These soils are classified as fine-loamy, mixed, isomesic Typic Haplohumults.

Typical pedon of Caspar sandy loam, in an area of Vandamme-Caspar complex, 2 to 15 percent slopes;

3,400 feet south and 3,500 feet west of the northeast corner of sec. 34, T. 18 N., R. 17 W., MDBM, Comptche Northwest quadrangle:

Oi—1 inch to 0; decomposing litter of Douglas-fir, redwood, and tanoak.

E1—0 to 4 inches; gray (10YR 6/1) sandy loam, dark gray (10YR 4/1) moist; weak very fine and fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine and common fine and medium roots; many very fine and fine interstitial and few fine tubular pores; very strongly acid (pH 5.0); abrupt wavy boundary.

E2—4 to 9 inches; light gray (10YR 7/1) sandy loam, grayish brown (10YR 5/2) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine and few medium roots; many very fine and common fine interstitial pores; 2 percent iron-cemented nodules (2 to 10 millimeters); slightly brittle when moist; very strongly acid (pH 4.6); clear wavy boundary.

EB—9 to 16 inches; variegated light gray (10YR 7/2) and light yellowish brown (10YR 6/4) sandy loam, grayish brown (10YR 5/2) and dark yellowish brown (10YR 4/4) moist; weak fine, medium, and coarse subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common fine, medium, and coarse roots; common very fine and fine interstitial and few fine tubular pores; 2 percent iron-cemented nodules (2 to 10 millimeters); slightly brittle when moist; very strongly acid (pH 4.6); gradual wavy boundary.

Bt1—16 to 27 inches; brownish yellow (10YR 6/6) sandy clay loam, yellowish brown (10YR 5/4) moist; weak fine, medium, and coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine, medium, and coarse roots; many very fine and fine and few fine interstitial and few fine tubular pores; common thin clay films lining pores and many thin clay films bridging mineral grains; very strongly acid (pH 4.6); clear wavy boundary.

Bt2—27 to 37 inches; yellowish brown (10YR 5/6) sandy clay loam, dark yellowish brown (10YR 4/6) moist; weak medium and coarse subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine and medium roots; common very fine and fine interstitial and few fine tubular pores; many moderately thick clay films on faces of peds and lining pores; 5 percent yellowish red (5YR 5/6) iron-cemented nodules (2 to 20 millimeters); very strongly acid (pH 4.5); gradual wavy boundary.

Bt3—37 to 48 inches; yellowish brown (10YR 5/6) sandy clay, yellowish brown (10YR 5/4) moist; moderate medium and coarse subangular blocky structure; hard, firm, sticky and plastic; common medium and coarse roots; common very fine and fine and few fine tubular pores; many moderately thick dark brown (10YR 4/3) clay films on faces of peds and lining pores; 5 percent yellowish red (5YR 5/6) iron-cemented nodules (2 to 20 millimeters); extremely acid (pH 4.4); clear wavy boundary.

CBt—48 to 62 inches; brownish yellow (10YR 6/6) sandy loam, dark yellowish brown (10YR 4/6) moist; massive; hard, friable, slightly sticky and slightly plastic; few fine roots; few very fine and fine interstitial pores; few thin clay films bridging mineral grains; extremely acid (pH 4.2).

The depth to bedrock ranges from 60 to more than 80 inches. The content of organic carbon in the upper meter averages from 0.8 to 1.0 percent. The mean annual soil temperature is 50 to 56 degrees F. The difference between the mean summer and mean winter soil temperatures ranges from 3 to 6 degrees F. The soil between the depths of 9 and 22 inches is moist in all parts from November 1 to August 1 and is dry in some part from September 1 to October 1 in most years.

The E horizon has color of 10YR 5/1, 5/2, 6/1, 6/4, 7/1, 7/2, or 8/1 or N 8/0. Moist color is 10YR 4/1, 4/2, 5/2, 6/1, 6/2, or 7/1. The content of clay ranges from 8 to 20 percent. Reaction is extremely acid or very strongly acid.

The Bt horizon has color of 10YR 5/6, 6/3, 6/4, 6/6, 7/3, 7/4, or 7/6 or 7.5YR 6/4, 6/6, or 7/6. Moist color is 10YR 4/4, 4/6, 5/4, 5/6, 5/8, 6/4, or 6/6 or 7.5YR 4/4, 5/4, 5/6, 6/4, or 6/6. The texture is sandy loam, loam, sandy clay loam, clay loam, or sandy clay. The content of clay ranges from 15 to 40 percent. The content of nodules (2 to 50 millimeters) ranges from 0 to 15 percent. Base saturation ranges from 5 to 20 percent. Reaction ranges from extremely acid to strongly acid.

The CBt horizon has color of 10YR 6/6 or 7/6 or 7.5YR 6/6 or 6/8. Moist color is 10YR 4/6, 5/6, or 6/6 or 7.5YR 4/6, 5/6, or 5/8. The texture is loamy sand or sandy loam. The content of clay ranges from 5 to 20 percent. Base saturation ranges from 5 to 20 percent. Reaction ranges from extremely acid to strongly acid.

Cleone Series

The Cleone series consists of very deep, somewhat poorly drained soils that formed in eolian sand. These soils are on marine terraces. Slopes range from 0 to 15 percent. The mean annual precipitation is about 50 inches, and the mean annual air temperature is about 53 degrees F.

These soils are classified as coarse-loamy, mixed, isomesic Typic Hapludults.

Typical pedon of Cleone loamy sand, 0 to 9 percent slopes, 3,150 feet south and 1,050 feet east of the northwest corner of sec. 31, T. 18 N., R. 17 W., MDBM, Fort Bragg quadrangle:

A—0 to 2 inches; dark gray (10YR 4/1) loamy sand, black (10YR 2/1) moist; weak very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; many very fine interstitial pores; moderately acid (pH 6.0); abrupt wavy boundary.

E—2 to 3 inches; gray (10YR 6/1) loamy sand, gray (10YR 5/1) moist; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; common very fine and fine interstitial pores; extremely acid (pH 4.2); abrupt wavy boundary.

2Bt1—3 to 7 inches; variegated light yellowish brown (10YR 6/4) sandy loam, dark yellowish brown (10YR 4/4) and brown (10YR 5/3) moist; common medium distinct brownish yellow (10YR 6/6) mottles, strong brown (7.5YR 4/6) moist; weak very fine, fine, and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine, fine, and medium roots; many very fine tubular and interstitial pores; common thin clay films bridging sand grains; 5 percent hard rounded nodules; very strongly acid (pH 4.7); clear wavy boundary.

2Bt2—7 to 13 inches; pale brown (10YR 6/3) gravelly sandy loam, dark brown (10YR 4/3) moist; many fine and medium distinct brownish yellow (10YR 6/6) mottles, strong brown (7.5YR 4/6) moist; weak very fine, fine, medium, and coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; many very fine interstitial and common very fine tubular pores; few thin clay films lining pores and common thin clay films bridging sand grains; 20 percent hard rounded nodules; strongly acid (pH 5.5); gradual wavy boundary.

2Bt3—13 to 18 inches; very pale brown (10YR 7/3) sandy loam, dark brown (10YR 4/3) moist; many medium and coarse distinct light yellowish brown (10YR 6/4) mottles, strong brown (7.5YR 4/6) moist; weak fine, medium, and coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; many very fine interstitial and common very fine tubular pores; common thin clay films bridging sand grains and few thin clay films on faces of peds; strongly acid (pH 5.5); clear wavy boundary.

2Bt4—18 to 28 inches; light yellowish brown (10YR 6/4) sandy loam, dark yellowish brown (10YR 4/4) moist; many coarse distinct brownish yellow (10YR 6/6) mottles, dark yellowish brown (10YR 4/6) moist; weak very fine, fine, medium, and coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; many very fine interstitial and few fine tubular pores; many thin clay films on faces of peds; strongly acid (pH 5.5); gradual wavy boundary.

3Bt5—28 to 40 inches; light yellowish brown (10YR 6/4) loamy sand, dark yellowish brown (10YR 4/6) moist; weak very fine, fine, medium, and coarse subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few very fine and fine roots; many very fine interstitial pores; common thin clay films bridging sand grains; moderately acid (pH 6.0); gradual wavy boundary.

4C—40 to 62 inches; very pale brown (10YR 7/4) sand, yellowish brown (10YR 5/4) moist; common medium distinct brownish yellow (10YR 6/6) and light gray (10YR 7/2) mottles, yellowish brown (10YR 5/6) and light brownish gray (10YR 6/2) moist; massive; slightly hard, friable, nonsticky and nonplastic; few very fine and fine roots; many very fine interstitial pores; moderately acid (pH 6.0).

The depth to bedrock is more than 60 inches. The mean annual soil temperature is 50 to 56 degrees F. The difference between the mean summer and mean winter soil temperatures ranges from 6 to 9 degrees F. The soil between the depths of 12 and 35 inches is moist in all parts from November 1 to August 1 and is dry in some part from September 1 to October 1 in most years. The soil is saturated following episodes of heavy rain from December through April. The saturated zone starts between the depths of 30 and 48 inches and extends to a depth of more than 60 inches. The soil is not saturated above a depth of 60 inches from summer through early fall.

The A horizon has color of 10YR 3/2, 3/3, 4/1, 4/2, 4/3, 5/1, 5/2, or 5/3 or 7.5YR 3/2. Moist color is 10YR

2/1, 2/2, 3/2, 3/3, 4/1, or 4/2 or 7.5YR 3/2 or 4/2. The content of clay ranges from 5 to 12 percent. Reaction ranges from very strongly acid to moderately acid.

The E horizon has color of 5Y 5/1 or 6/1; 10YR 5/1, 6/1, or 7/1; or N 7/0 or 8/0. Moist color is 5Y 5/1 or 5/2 or 10YR 5/1 or 6/1. The content of clay ranges from 3 to 10 percent. Reaction is extremely acid or very strongly acid.

The Bt horizon has color of 2.5Y 5/4 or 6/4 or 10YR 4/3, 5/3, 6/3, 6/4, 7/3, or 7/4. Moist color is 2.5Y 4/4 or 5/4; 10YR 4/3, 4/4, 4/6, 5/3, 5/4, or 6/6; or 7.5YR 4/4, 4/6, or 5/4. Mottles have dry color of 10YR 6/4 or 6/6 or 7.5YR 6/4 or 6/6 and moist color of 10YR 4/3, 4/4, or 4/6 or 7.5YR 4/4 or 4/6. The texture of this horizon is loamy sand, sandy loam, gravelly loamy sand, or gravelly sandy loam. The content of clay ranges from 8 to 18 percent. The content of nodules ranges from 0 to 25 percent. Base saturation ranges from 5 to 35 percent. Reaction ranges from very strongly acid to moderately acid.

The C horizon has color of 2.5Y 5/4 or 10YR 6/3, 7/3, or 7/4. Moist color is 2.5Y 4/4 or 10YR 4/4, 5/3, 5/4, or 6/3. Mottles have dry color of 2.5Y 7/6 or 7/8 or 10YR 6/6, 7/2, 7/3, 7/6, 7/8, or 8/3 and moist color of 10YR 4/6, 5/6, 6/2, or 6/3. Mottles with chroma of 2 are between the depths of 30 and 48 inches and continue to a depth of 60 inches or more. The texture of this horizon is loamy sand or sand that contains 3 to 10 percent clay. Base saturation ranges from 5 to 35 percent. In some pedons the C horizon is weakly cemented. Reaction is moderately acid or slightly acid.

Cole Series

The Cole series consists of very deep, somewhat poorly drained soils that formed in alluvium derived from mixed rock sources. These soils are on river terraces. Slopes range from 0 to 5 percent. The mean annual precipitation is about 50 inches, and the mean annual air temperature is about 55 degrees F.

These soils are classified as fine, mixed, thermic Pachic Argixerolls.

Typical pedon of Cole loam, 0 to 5 percent slopes, 1,550 feet south and 500 feet east of the northwest corner of sec. 27, T. 21 N., R. 15 W., MDBM, Cahto Peak quadrangle:

A1—0 to 18 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and plastic; many very fine and few fine roots; many very fine interstitial and common very fine and fine tubular pores; 5 percent gravel; slightly acid (pH 6.3); gradual wavy boundary.

A2—18 to 30 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium subangular blocky structure; hard, firm, sticky and plastic; common very fine and fine roots; common very fine interstitial and tubular pores; 10 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.

Bt1—30 to 45 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; common fine distinct strong brown (7.5YR 5/6) mottles, strong brown (7.5YR 4/6) moist; strong medium and coarse subangular blocky structure; very hard, firm, sticky and plastic; few very fine and fine roots; common very fine interstitial and tubular pores; many moderately thick clay films on faces of peds and lining pores; 5 percent gravel; neutral (pH 6.8); gradual wavy boundary.

Bt2—45 to 60 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; common fine prominent strong brown (7.5YR 5/6) mottles, strong brown (7.5YR 4/6) moist; moderate medium subangular blocky structure; very hard, very firm, sticky and plastic; few very fine roots; common very fine interstitial pores; many moderately thick clay films on faces of peds and lining pores; 10 percent gravel; neutral (pH 7.0).

The depth to bedrock is more than 60 inches. The mollic epipedon is 20 to 40 inches thick and has 2 to 4 percent organic matter. The mean annual soil temperature ranges from 59 to 63 degrees F. The soil between the depths of 6 and 19 inches is moist in all parts from December 1 to April 30 and is dry in all parts from August 1 to October 1 in most years. The soil is saturated with water for brief or long periods following episodes of heavy rain from November through May. The saturated zone starts between the depths of 30 and 42 inches and extends to a depth of more than 60 inches. The soil is not saturated above a depth of 60 inches from summer through early fall. The water table has been lowered in some areas by artificial drainage or stream entrenchment. The content of gravel ranges from 0 to 15 percent. Base saturation ranges from 75 to 90 percent throughout. Reaction is slightly acid or neutral.

The A horizon has color of 10YR 3/2, 4/1, 4/2, 5/2, or 5/3. Moist color is 10YR 2/1, 2/2, 3/1, 3/2, or 3/3. The content of clay ranges from 22 to 27 percent.

The Bt horizon has color of 2.5Y 5/2 or 10YR 4/2, 4/3, 5/2, 5/3, or 5/4. Moist color is 2.5Y 3/2 or 4/2 or 10YR 3/1, 3/2, 3/3, 4/1, 4/2, 4/3, or 4/4. Mottles have dry color of 7.5YR 5/6 or 6/6 and moist color of

7.5YR 4/6, 5/6, or 5/8. The texture of this horizon is clay loam or clay. The content of clay ranges from 35 to 50 percent.

Comptche Series

The Comptche series consists of well drained soils that are deep or very deep to bedrock. These soils formed in material weathered from metamorphosed basalt. They are on hills and mountains. Slopes range from 30 to 75 percent. The mean annual precipitation is about 60 inches, and the mean annual air temperature is about 53 degrees F.

These soils are classified as fine, oxidic, isomesic Pachic Argiustolls.

Typical pedon of Comptche gravelly loam, in an area of Comptche-Zeni complex, 50 to 75 percent slopes; 1,500 feet south and 3,750 feet west of the northeast corner of sec. 16, T. 14 N., R. 15 W., MDBM, Navarro Southeast quadrangle:

Oi—1 inch to 0; litter of redwood and tanoak leaves and twigs.

A—0 to 6 inches; dark reddish gray (5YR 4/2) gravelly loam, dusky red (2.5YR 3/2) moist; moderate very fine and fine granular structure; hard, friable, slightly sticky and slightly plastic; many fine and medium and few coarse roots; many very fine and fine interstitial pores; 15 percent gravel (2 to 25 millimeters); slightly acid (pH 6.5); clear wavy boundary.

AB—6 to 11 inches; dark reddish gray (5YR 4/2) gravelly clay loam, dusky red (2.5YR 3/2) moist; moderate fine and medium subangular blocky structure; hard, firm, sticky and plastic; many fine and medium and few coarse roots; common fine and few medium interstitial pores; 20 percent gravel (2 to 25 millimeters); slightly acid (pH 6.5); gradual wavy boundary.

Bt1—11 to 31 inches; reddish brown (5YR 4/3) gravelly clay loam, dark reddish brown (5YR 3/3) moist; moderate fine and medium subangular blocky structure; very hard, very firm, sticky and very plastic; common fine, medium, and coarse roots; common fine and few medium interstitial pores; common thin clay films on faces of peds and lining pores; 25 percent gravel (2 to 25 millimeters); slightly acid (pH 6.4); gradual wavy boundary.

Bt2—31 to 49 inches; reddish brown (5YR 5/3) gravelly clay, dark reddish brown (5YR 3/4) moist; moderate fine and medium subangular blocky structure; very hard, very firm, sticky and very plastic; common fine, medium, and coarse roots; common fine and few medium interstitial pores; many moderately thick clay films on faces of peds and lining pores; 25 percent gravel (2 to 50 millimeters); moderately acid (pH 6.0); clear wavy boundary.

Bt3—49 to 69 inches; reddish brown (5YR 5/3) very gravelly clay, dark reddish brown (5YR 3/4) moist; strong fine subangular blocky structure; very hard, very firm, sticky and very plastic; few fine, medium, and coarse roots; few fine and medium interstitial pores; many moderately thick clay films on faces of peds and lining pores; 40 percent gravel (2 to 75 millimeters); strongly acid (pH 5.5); abrupt wavy boundary.

R—69 to 72 inches; hard, fractured meta-basalt; fractures are 1 to 10 centimeters apart and less than 2 millimeters wide; continuous moderately thick and thick clay films on fracture faces.

The depth to hard bedrock ranges from 40 to 70 inches. The mollic epipedon is 20 to 40 inches thick and has 2 to 10 percent organic matter. The mean annual soil temperature ranges from 50 to 56 degrees F. The difference between the mean summer and mean winter soil temperatures ranges from 5 to 9 degrees F. The soil between the depths of 8 and 22 inches is moist in all parts from November 1 to June 1 and is dry in some or all parts from July 15 to October 1 in most years. Base saturation ranges from 50 to 85 percent throughout. Reaction ranges from strongly acid to slightly acid.

The A horizon has color of 5YR 4/2, 4/3, or 4/4 or 2.5YR 4/2 or 4/4. Moist color is 5YR 2/2, 3/2, or 3/3 or 2.5YR 3/2 or 3/3. The content of clay ranges from 18 to 27 percent. The content of gravel ranges from 15 to 25 percent.

The Bt horizon has color of 5YR 4/3, 4/4, 5/3, or 5/4 or 2.5YR 4/2 or 4/4. Moist color is 2.5YR 2.5/4 or 3/4 or 5YR 3/2, 3/3, 3/4, or 4/3. The texture is gravelly clay loam, very gravelly clay loam, gravelly clay, or very gravelly clay. The content of clay ranges from 27 to 50 percent. The content of gravel ranges from 15 to 50 percent.

Cottoneva Series

The Cottoneva series consists of very deep, somewhat poorly drained soils that formed in alluvium derived from sandstone. These soils are on flood plains. Slopes range from 0 to 2 percent. The mean annual precipitation is about 45 inches, and the mean annual air temperature is about 53 degrees F.

These soils are classified as coarse-loamy, mixed, nonacid, isomesic Typic Tropofluvents.

Typical pedon of Cottoneva loam, 0 to 2 percent slopes, 1,700 feet north and 500 feet west of the southeast corner of sec. 14, T. 22 N., R. 18 W., MDBM, Hales Grove quadrangle:

A1—0 to 6 inches; pale brown (10YR 6/3) loam, dark brown (10YR 4/3) moist; weak medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common fine and medium roots; few fine interstitial and few fine and medium tubular pores; slightly acid (pH 6.2); clear wavy boundary.

A2—6 to 12 inches; light yellowish brown (10YR 6/4) loam, dark yellowish brown (10YR 4/4) moist; weak fine and medium angular blocky structure; slightly hard, friable, nonsticky and slightly plastic; few fine and medium roots; few fine interstitial and few fine and medium tubular pores; slightly acid (pH 6.1); gradual wavy boundary.

C1—12 to 31 inches; light yellowish brown (10YR 6/4) sandy loam, dark yellowish brown (10YR 4/4) moist; massive; soft, friable, slightly sticky and slightly plastic; few fine roots; few fine tubular pores; slightly acid (pH 6.2); gradual wavy boundary.

C2—31 to 43 inches; light yellowish brown (10YR 6/4) sandy loam, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; few fine tubular pores; slightly acid (pH 6.2); clear wavy boundary.

C3—43 to 48 inches; pale brown (10YR 6/3) loam, dark brown (10YR 4/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common very fine interstitial and few fine tubular pores; slightly acid (pH 6.2); clear wavy boundary.

C4—48 to 55 inches; pale brown (10YR 6/3) sandy clay loam, dark brown (10YR 4/3) moist; few fine distinct light gray (5Y 6/1) mottles, light gray (5Y 6/1) moist; massive; hard, firm, sticky and very plastic; slightly acid (pH 6.2); clear wavy boundary.

Cg—55 to 63 inches; greenish gray (5BG 6/1) clay loam, dark greenish gray (5BG 4/1) moist; common coarse distinct brownish yellow (10YR 6/6) and light yellowish brown (10YR 6/4) mottles, yellowish brown (10YR 5/6 and 5/4) moist; massive; hard, firm, sticky and plastic; slightly acid (pH 6.2).

The depth to bedrock is more than 60 inches. The mean annual soil temperature is 50 to 54 degrees F. The difference between the mean summer and mean winter soil temperatures ranges from 5 to 9 degrees F. The soil between the depths of 6 and 19 inches is moist in all parts from November 1 to August 15 and is dry in some part from September 1 to October 1 in most years. The soil is saturated with water for brief or long periods following episodes of heavy rain from December through April. The saturated zone starts between the depths of 30 and 48 inches and extends to a depth of more than 60 inches. Reaction is moderately acid or slightly acid.

The A horizon has color of 10YR 6/2, 6/3, or 6/4. Moist color is 10YR 3/3, 4/3, or 4/4. The content of clay ranges from 10 to 20 percent.

The C horizon has color of 10YR 6/2, 6/3, or 6/4 or 5BG 6/1. Moist color is 10YR 4/3 or 4/4 or 5BG 4/1. Mottles and gleyed colors are below a depth of 30 inches. This horizon is stratified sandy loam, loam, silt loam, sandy clay loam, or clay loam. The content of clay ranges from 5 to 35 percent.

Crispin Series

The Crispin series consists of well drained soils that are moderately deep to a hardpan. These soils formed in alluvium derived from mixed rock sources. They are on marine terraces. Slopes range from 0 to 5 percent. The mean annual precipitation is about 40 inches, and the mean annual air temperature is about 53 degrees F.

These soils are classified as fine-loamy, mixed, isomesic Ultic Haplustalfs.

Typical pedon of Crispin loam, 0 to 5 percent slopes, 625 feet north and 300 feet west of the southeast corner of sec. 13, T. 13 N., R. 17 W., MDBM, Point Arena quadrangle:

A—0 to 6 inches; dark brown (10YR 3/3) loam, very dark brown (10YR 2/2) moist; strong very fine, fine, and medium granular structure; hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine tubular and interstitial pores; 5 percent hard subrounded sandstone gravel; moderately acid (pH 5.8); clear wavy boundary.

AB—6 to 14 inches; dark brown (10YR 3/3) loam, very dark brown (10YR 2/2) moist; moderate fine and medium subangular blocky structure; hard, friable, sticky and plastic; common very fine and fine roots; many very fine tubular and interstitial pores; 5 percent hard subrounded sandstone gravel; strongly acid (pH 5.4); clear wavy boundary.

Bt—14 to 23 inches; brown (10YR 4/3) loam, very dark brown (10YR 2/2) moist; moderate fine and medium subangular blocky structure; hard, friable, sticky and plastic; common very fine and

fine roots; many very fine tubular and interstitial pores; few thin clay films lining pores and bridging mineral grains; 5 percent hard subrounded sandstone gravel; moderately acid (pH 5.8); abrupt irregular boundary.

2Btm—23 to 62 inches; variegated yellowish brown (10YR 5/6) and yellow (10YR 7/6), weakly cemented gravelly sandy loam, strong brown (7.5YR 4/6) and yellowish brown (10YR 5/6) moist; massive; very hard, very firm, nonsticky and nonplastic; few very fine roots; many very fine tubular pores; few thin clay films lining pores; 15 percent hard subrounded and subangular gravel; very strongly acid (pH 4.8).

The depth to bedrock is more than 60 inches. The depth to a cemented pan ranges from 20 to 40 inches. The umbric epipedon is 20 to 40 inches thick and contains 3 to 8 percent organic matter. The mean annual soil temperature ranges from 50 to 56 degrees F. The difference between the mean summer and mean winter soil temperatures ranges from 6 to 9 degrees F. The soil between the depths of 6 and 18 inches is moist in all parts from November 1 to June 1. The moisture control section is dry in some or all part from July 1 to October 1 in most years.

The A horizon has color of 10YR 3/2, 3/3, 4/2, or 4/3. Moist color is 10YR 2/2 or 3/2. The content of clay ranges from 15 to 20 percent. The content of gravel ranges from 0 to 5 percent. Base saturation ranges from 35 to 50 percent. Reaction is strongly acid or moderately acid.

The Bt horizon has color of 10YR 3/2, 3/3, 4/2, or 4/3. Moist color is 10YR 2/2, 3/2, or 3/3. The content of clay ranges from 23 to 27 percent. The content of gravel ranges from 0 to 5 percent. Base saturation ranges from 50 to 70 percent.

The 2Btm horizon has color of 7.5YR 4/6 or 5/6 or 10YR 5/6, 6/6, or 7/6. Moist color is 7.5YR 4/4 or 4/6 or 10YR 5/4 or 5/6. The content of clay ranges from 10 to 15 percent. The content of gravel ranges from 15 to 30 percent. Base saturation ranges from 60 to 80 percent. The horizon is weakly or strongly cemented.

Dann Series

The Dann series consists of well drained soils that are moderately deep to bedrock. These soils formed in material weathered from ultramafic intrusive rocks. They are on mountains. Slopes range from 5 to 75 percent. The mean annual precipitation is about 65 inches, and the mean annual air temperature is about 55 degrees F.

These soils are classified as clayey-skeletal, oxidic, mesic Typic Xerochrepts.

Typical pedon of Dann very cobbly clay loam, in an area of Dann-Littlered-Hiltabidel complex, 5 to 30 percent slopes; 2,150 feet south and 1,800 feet west of the northeast corner of sec. 19, T. 24 N., R. 16 W., MDBM, Noble Butte quadrangle:

A—0 to 5 inches; reddish brown (2.5YR 4/4) very cobbly clay loam, dusky red (10YR 3/3) moist; strong very fine and fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine and common medium roots; many very fine interstitial pores; 5 percent gravel, 30 percent cobbles, and 10 percent stones; slightly acid (pH 6.4); abrupt wavy boundary.

Bw1—5 to 21 inches; strong brown (7.5YR 5/6) extremely stony clay loam, dark brown (7.5YR 4/4) moist; weak very fine granular structure; soft, very friable, sticky and slightly plastic; many very fine and fine and common medium roots; many fine interstitial pores; 5 percent gravel, 15 percent cobbles, and 50 percent stones; neutral (pH 6.8); clear irregular boundary.

Bw2—21 to 31 inches; strong brown (7.5YR 5/6) extremely stony clay loam, dark brown (7.5YR 4/4) moist; weak fine subangular blocky structure; soft, very friable, sticky and slightly plastic; common fine and medium roots; common very fine interstitial pores; 10 percent greenish gray (5GY 6/1) saprolite with black (N 2/0) and strong brown (7.5YR 5/8) stains along fractures; 5 percent gravel, 15 percent cobbles, and 50 percent stones; neutral (pH 7.0); abrupt irregular boundary.

R—31 to 60 inches; variegated reddish yellow (7.5YR 7/8) and greenish gray (5GY 6/1), hard, fractured, slightly weathered peridotite; many black (N 2/0) stains along fractures that are 1 to 2 millimeters and 3 to 10 centimeters apart.

The depth to hard bedrock ranges from 20 to 40 inches. The mean annual soil temperature ranges from 53 to 57 degrees F. The soil between the depths of 10 and 35 inches or between the depth of 10 inches and bedrock, whichever is shallower, is moist in all parts from November 1 to June 1 and is dry in all parts from July 15 to October 1 in most years. Base saturation ranges from 50 to 75 percent throughout the profile. Reaction is slightly acid or neutral throughout.

The A horizon has color of 2.5YR 4/4 or 5/4 or 5YR 5/4. Moist color is 10R 3/3 or 3/4 or 2.5YR 3/4 or 3/6. The content of clay ranges from 27 to 35 percent.

The content of gravel ranges from 2 to 10 percent, the content of cobbles ranges from 25 to 35 percent, and the content of stones ranges from 5 to 15 percent.

The Bw horizon has color of 7.5YR 4/6, 5/4, 5/6, or 6/6 or 5YR 5/4. Moist color is 7.5YR 4/4 or 4/6, 5YR 4/4 or 4/6, or 2.5Y 3/4 or 3/6. The texture is very stony clay loam, extremely stony clay loam, or very stony clay that contains 35 to 50 percent clay. The total content of coarse fragments ranges from 35 to 70 percent. The content of gravel ranges from 2 to 10 percent, the content of cobbles ranges from 15 to 45 percent, and the content of stones ranges from 25 to 60 percent.

Dehaven Series

The Dehaven series consists of well drained soils that are deep to bedrock. These soils formed in material weathered from sandstone. They are on hills. Slopes range from 30 to 99 percent. The mean annual precipitation is about 55 inches, and the mean annual air temperature is about 53 degrees F.

These soils are classified as loamy-skeletal, mixed, isomesic Mollic Hapludalfs.

Typical pedon of Dehaven gravelly loam, in an area of Dehaven-Hotel complex, 50 to 75 percent slopes; 2,250 feet north and 1,400 feet east of the southwest corner of sec. 24, T. 11 N., R. 15 W., MDBM, Ornbaun Valley Southwest quadrangle:

Oi—2 inches to 0; litter of redwood leaves and twigs.

A1—0 to 6 inches; brown (10YR 5/3) gravelly loam, dark brown (10YR 3/3) moist; strong very fine and fine granular structure; slightly hard, friable, slightly sticky and plastic; many very fine, fine, and medium roots; many very fine and fine interstitial pores; 15 percent gravel; slightly acid (pH 6.1); clear irregular boundary.

A2—6 to 17 inches; pale brown (10YR 6/3) gravelly loam, dark brown (10YR 4/3) moist; moderate very fine and fine granular structure; slightly hard, friable, slightly sticky and plastic; many very fine and fine and few medium and coarse roots; many very fine and fine interstitial pores; 20 percent gravel; moderately acid (pH 6.0); gradual wavy boundary.

Bt1—17 to 34 inches; brownish yellow (10YR 6/6) very gravelly sandy clay loam, dark yellowish brown (10YR 4/4) moist; moderate very fine and fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine and few medium, coarse, and very coarse roots; many very fine and fine interstitial pores; few thin clay films bridging mineral grains; 55 percent gravel; moderately acid (pH 5.5); gradual irregular boundary.

Bt2—34 to 52 inches; brownish yellow (10YR 6/6) extremely gravelly sandy clay loam, dark yellowish brown (10YR 4/4) moist; moderate very fine and fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; few very fine, fine, and medium roots; many very fine and fine interstitial pores; common moderately thick clay films bridging mineral grains and on faces of peds; 70 percent gravel; 2 percent cobbles; moderately acid (pH 5.6); clear wavy boundary.

R—52 inches; hard, fractured sandstone; fractures are about 1 millimeter wide and 1 to 10 centimeters apart; rock does not slake in water.

The depth to hard bedrock ranges from 40 to 60 inches. The mean annual soil temperature ranges from 50 to 56 degrees F. The difference between the mean summer and mean winter soil temperatures ranges from 3 to 6 degrees F. The soil between the depths of 7 and 27 inches is moist in all parts from November 1 to August 1 and is dry in some part from September 1 to October 1 in most years. Reaction is moderately acid or slightly acid.

The A horizon has color of 10YR 3/2, 3/4, 4/3, 4/4, 5/2, 5/3, 6/2, 6/3, 6/4, or 7/3. Moist color is 10YR 2/2, 3/2, 3/3, 3/4, 4/2, 4/3, or 4/4. The content of clay ranges from 15 to 27 percent. The content of gravel ranges from 15 to 35 percent. Base saturation ranges from 50 to 75 percent.

The Bt horizon has color of 10YR 4/3, 5/3, 5/4, 5/6, 5/8, 6/3, 6/4, 6/6, 7/3, or 7/4. Moist color is 10YR 3/4, 4/3, 4/4, 4/6, 5/3, 5/4, 5/6, or 6/4. The texture is very gravelly clay loam, very gravelly sandy clay loam, extremely gravelly clay loam, or extremely gravelly sandy clay loam. The content of clay ranges from 20 to 35 percent. The content of gravel ranges from 35 to 80 percent. The content of cobbles ranges from 0 to 15 percent. Base saturation ranges from 65 to 85 percent.

Dystropepts

Dystropepts consist of well drained soils that are shallow or moderately deep to bedrock. These soils are on side slopes of marine terraces or coastal hills. They formed in sandstone or shale. Slopes range from 30 to 75 percent. The mean annual precipitation is about 40 inches, and the mean annual air temperature is about 53 degrees F.

Reference pedon of Dystropepts, 30 to 75 percent slopes, 2,050 feet south and 2,000 feet west of the northeast corner of sec. 2, T. 12 N., R. 17 W., MDBM, Point Arena quadrangle:

A1—0 to 11 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; strong very fine and fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and few fine and medium roots; many very fine interstitial and common very fine tubular pores; 10 percent hard angular shale gravel; slightly acid (pH 6.2); gradual wavy boundary.

A2—11 to 19 inches; dark grayish brown (10YR 4/2) very gravelly clay loam, black (10YR 2/1) moist; strong very fine and fine granular structure; slightly hard, friable, slightly sticky and plastic; many very fine and few fine and medium roots; many very fine interstitial and common very fine tubular pores; 35 percent hard, slightly hard, and soft angular shale gravel and 5 percent hard shale cobbles; very strongly acid (pH 5.0); clear wavy boundary.

R—19 inches; hard, slightly hard, and soft, fractured shale.

The depth to bedrock ranges from 10 to 40 inches. The mean annual soil temperature ranges from 50 to 56 degrees F. The difference between the mean summer and mean winter soil temperatures ranges from 6 to 9 degrees F. The soil between the depths of 7 and 24 inches, or between 7 inches and bedrock if bedrock is at a depth of less than 24 inches, is moist in all parts from November 1 to June 1. The moisture control section is dry in some or all parts from July 1 to October 1 in most years. Base saturation ranges mainly from 30 to 70 percent and is less than 50 percent in some horizons.

The A horizon has color of 10YR 3/2, 3/3, 4/2, 4/3, 5/2, 5/3, or 6/2. Moist color is 10YR 2/1, 2/2, 3/2, 4/2, or 4/3. The content of clay ranges from 15 to 35 percent. The content of hard gravel ranges from 5 to 50 percent. The content of hard cobbles ranges from 0 to 10 percent. The total content of coarse fragments ranges from 5 to 50 percent.

The Bw horizon, if it occurs, has color of 10YR 3/2, 3/3, 4/2, 4/3, 5/2, 5/3, or 6/2. Moist color is 10YR 2/1, 2/2, 3/2, 4/2, or 4/3. This horizon is loam or clay loam or the gravelly or very gravelly analogs of these textures. The content of clay ranges from 20 to 35 percent. The content of hard gravel ranges from 5 to 50 percent. The content of hard cobbles ranges from 0 to 20 percent. The total content of coarse fragments ranges from 5 to 60 percent.

Etsel Series

The Etsel series consists of somewhat excessively drained soils that are very shallow and shallow to bedrock. These soils formed in material weathered from sandstone or shale. They are on mountains. Slopes range from 30 to 75 percent. The mean annual precipitation is about 55 inches, and the mean annual temperature is about 55 degrees F.

These soils are classified as loamy-skeletal, mixed, nonacid, mesic Lithic Xerorthents.

Typical pedon of Etsel gravelly sandy loam, in an area of Maymen-Etsel-Snook complex, 30 to 75 percent slopes; 1,800 feet north and 500 feet west of the southeast corner of sec. 15, T. 17 N., R. 14 W., MDBM, Willits Southwest quadrangle:

A—0 to 5 inches; brown (10YR 5/3) gravelly sandy loam, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine and few medium roots; common very fine tubular and interstitial pores; 30 percent hard angular and subangular gravel; slightly acid (pH 6.5); clear wavy boundary.

C—5 to 14 inches; pale brown (10YR 6/3) very gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; moderate very fine and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine, fine, and medium roots; common very fine tubular and interstitial pores; 60 percent hard angular gravel; slightly acid (pH 6.5); abrupt wavy boundary.

R—14 inches; hard, fractured shale; few roots along fractures.

The depth to bedrock ranges from 8 to 14 inches. The mean annual soil temperature ranges from 56 to 59 degrees F. The soil is moist in all parts from November 1 to May 1 and is dry in all parts from June 1 to October 15 in most years. The content of clay ranges from 12 to 18 percent throughout.

The A horizon has color of 10YR 5/3 or 6/3. Moist color is 10YR 3/3 or 4/3. The content of gravel ranges from 25 to 35 percent.

The C horizon has color of 10YR 6/3 or 6/4. Moist color is 10YR 4/3 or 4/4. The content of gravel ranges from 40 to 65 percent.

Feliz Series

The Feliz series consists of very deep, well drained soils that formed in alluvium derived from

mixed rock sources. These soils are on flood plains. Slopes range from 0 to 5 percent. The mean annual precipitation is about 50 inches, and the mean annual air temperature is about 55 degrees F.

The Feliz soils in this survey area have brighter colors, lower base saturation, and lower pH than are defined as the range for the series. These soils are classified as fine-loamy, mixed, thermic Cumulic Haploxerolls.

Typical pedon of Feliz loam, 0 to 5 percent slopes, 2,530 feet west of the northeast corner of sec. 10, T. 21 N., R. 15 W., MDBM, Cahto Peak quadrangle:

A1—0 to 5 inches; brown (10YR 5/3) loam, very dark grayish brown (10YR 3/2) moist; strong very fine and fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine and few medium roots; many very fine and fine interstitial and few very fine tubular pores; 5 percent subrounded gravel; slightly acid (pH 6.1); clear smooth boundary.

A2—5 to 18 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; strong fine and medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine and fine tubular and interstitial pores; 10 percent subrounded gravel; slightly acid (pH 6.3); gradual wavy boundary.

A3—18 to 27 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine and fine tubular and interstitial pores; 10 percent subrounded gravel; slightly acid (pH 6.3); clear wavy boundary.

C1—27 to 37 inches; pale brown (10YR 6/3) loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine tubular pores; 10 percent subrounded gravel; slightly acid (pH 6.4); clear wavy boundary.

C2—37 to 43 inches; pale brown (10YR 6/3) loam, dark brown (10YR 3/3) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; many very fine tubular pores; 5 percent subangular gravel; slightly acid (pH 6.4); gradual smooth boundary.

2C3—43 to 60 inches; dark yellowish brown (10YR 4/4) clay loam, dark brown (10YR 3/3) moist; strong fine and medium subangular blocky structure; hard, firm, sticky and plastic; few very fine roots; common very fine tubular pores; 5 percent subrounded gravel; slightly acid (pH 6.2).

The depth to bedrock is more than 60 inches. The mollic epipedon is 20 to 30 inches thick and has 2 to 5 percent organic matter. The mean annual soil temperature ranges from 59 to 62 degrees F. The soil between the depths of 7 and 21 inches is moist in all parts from November 1 to May 1 and is dry in all parts from June 15 to October 1 in most years. Reaction is moderately acid or slightly acid throughout.

The A horizon has color of 10YR 4/3 or 5/3. Moist color is 10YR 2/2, 3/2, or 3/3. The content of clay ranges from 18 to 27 percent. The content of gravel ranges from 0 to 15 percent. Base saturation ranges from 50 to 75 percent.

The C horizon has color of 10YR 4/4, 5/3, 5/4, 6/3, or 6/4. Moist color is 10YR 3/3, 3/4, or 4/4. The texture is loam or clay loam that contains 20 to 30 percent clay. The content of gravel typically ranges from 0 to 15 percent. Some pedons have gravelly or very gravelly textures below a depth of 40 inches. Base saturation ranges from 60 to 85 percent.

Ferncreek Series

The Ferncreek series consists of very deep, somewhat poorly drained soils that formed in marine sediments. These soils are on marine terraces. Slopes range from 2 to 30 percent. The mean annual precipitation is about 50 inches, and the mean annual air temperature is about 53 degrees F.

These soils are classified as clayey, mixed, isomesic Plinthic Haplohumults.

Typical pedon of Ferncreek sandy loam, 2 to 9 percent slopes, 300 feet north and 700 feet west of the southeast corner of sec. 5, T. 17 N., R. 17 W., MDBM, Mendocino quadrangle:

Oi—2 inches to 0; litter of redwood and bishop pine.

E1—0 to 3 inches; variegated gray (10YR 6/1) and light gray (N 7/0) sandy loam, pinkish gray (5YR 6/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; slightly brittle when moist; slightly smeary; common fine, medium, and coarse roots; few very fine and fine tubular and common very fine interstitial pores; extremely acid (pH 3.9); clear wavy boundary.

E2—3 to 7 inches; white (10YR 8/1) sandy loam, light brownish gray (10YR 6/2) moist; massive; hard, very friable, slightly sticky and slightly plastic; slightly brittle when moist; slightly smeary; common very fine, fine, and medium and few

coarse roots; few very fine and fine tubular pores; extremely acid (pH 4.3); clear wavy boundary.

Bt1—7 to 12 inches; very pale brown (10YR 7/4) clay loam, yellowish brown (10YR 5/6) moist; weak fine angular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; slightly brittle when moist; few very fine, fine, and medium roots; few very fine and fine tubular and very fine interstitial pores; few thin clay films on faces of peds and bridging mineral grains; very strongly acid (pH 4.9); clear wavy boundary.

Bt2—12 to 24 inches; light yellowish brown (10YR 6/4) clay, yellowish brown (10YR 5/6) moist; moderate very fine and fine subangular blocky structure; slightly hard, friable, sticky and plastic; few very fine, fine, and medium roots; few very fine tubular and common very fine interstitial pores; few thin and moderately thick clay films on faces of peds and lining pores; very strongly acid (pH 4.9); clear wavy boundary.

Btv1—24 to 33 inches; brownish yellow (10YR 6/6) clay, yellowish brown (10YR 5/8) moist; common medium distinct reddish yellow (7.5YR 6/6) mottles, strong brown (7.5YR 5/8) moist; common medium prominent red (2.5YR 4/6) mottles, red (2.5YR 4/6) moist; moderate fine and medium subangular blocky structure; slightly hard, firm, sticky and plastic; few very fine roots; few very fine tubular and interstitial pores; many moderately thick and thick clay films on faces of peds and lining pores; most red color is soft natural plinthite that is firm when moist; very strongly acid (pH 4.9); gradual wavy boundary.

Btv2—33 to 43 inches; brownish yellow (10YR 6/6) sandy clay loam, yellowish brown (10YR 5/8) moist; many medium prominent red (2.5YR 4/8) mottles, red (2.5YR 4/6) moist; common fine and medium white (10YR 8/1) mottles, pinkish white (7.5YR 8/2) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; few very fine tubular and many very fine interstitial pores; common moderately thick and thick clay films on faces of peds and lining pores; most red color is soft natural plinthite that is firm when moist; very strongly acid (pH 4.9); clear wavy boundary.

BCtv—43 to 61 inches; yellow (10YR 7/6) sandy loam, strong brown (7.5YR 5/8) moist; many coarse prominent red (2.5YR 4/8) mottles, red (2.5YR 4/8) moist; common medium prominent white (10YR 8/1) mottles, pinkish gray (7.5YR 7/2) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; many very fine interstitial and few very fine tubular pores; common thin clay films bridging mineral grains; most red color is soft natural plinthite that is firm when moist; very strongly acid (pH 4.9).

The depth to bedrock is more than 80 inches. The content of organic carbon in the upper meter averages 1.3 percent. The mean annual soil temperature is 50 to 56 degrees F. The difference between the mean summer and mean winter soil temperatures ranges from 3 to 6 degrees F. The soil between the depths of 7 and 20 inches is moist in all parts from November 1 to August 1 and is dry in some part from September 1 to October 1 in most years. The soil is saturated with water for brief or long periods following episodes of heavy rain from December through April. The saturated zone starts between the depths of 24 and 48 inches and extends to a depth of more than 60 inches. The soil is not saturated above a depth of 60 inches from summer through early fall. Reaction is extremely acid to strongly acid throughout.

The E horizon has color of 5Y 5/1 or 6/1; 10YR 5/2, 5/3, 6/1, 6/2, 7/2, or 8/1; or N 7/0 or 8/0. Moist color is 10YR 5/1, 5/2, 6/1, 6/2, or 7/1 or 5YR 6/2. The content of clay ranges from 3 to 15 percent. The content of iron nodules ranges from 0 to 15 percent. The horizon may be slightly smeary and may be slightly brittle when moist. Some pedons have a transitional EB horizon.

The Bt horizon has color of 10YR 5/8, 6/2, 6/4, 6/6, 6/8, 7/4, 7/6, 8/2, or 8/3; 7.5YR 6/6 or 7/6; or 5YR 5/8. Moist color is 5Y 7/1; 2.5Y 5/2, 6/4, or 7/2; 10YR 5/4, 5/6, 5/8, 6/6, 6/8, 8/1, or 8/3; 7.5YR 5/8; or 5YR 5/8. The upper part is variegated in some pedons. Mottles have dry color of 10YR 5/4, 6/6, 6/8, 7/8, 8/1, or 8/2; 7.5YR 6/6; 5YR 5/8; or 2.5YR 4/6 or 4/8 and moist color of 5Y 6/2 or 7/1; 2.5Y 5/2, 5/4, 6/2, or 6/4; 10YR 6/8, 7/4, or 7/6; 7.5YR 5/6, 5/8, 7/2, or 8/2; 5YR 4/6 or 5/6; or 2.5YR 3/6, 4/6, or 4/8. Grayish colors occur with brownish and reddish colors in a regular reticulate pattern beginning between the depths of 30 and 48 inches and continuing to a depth of 60 inches or more. The Bt horizon is clay, clay loam, or sandy clay loam. The content of clay ranges from 30 to 60 percent. The content of iron nodules ranges from 0 to 15 percent. About 5 to 45 percent soft natural plinthite is in the lower part. Base saturation ranges from 5 to 35 percent.

The C horizon, if it occurs, has color of 10YR 7/6 or 8/3 or 2.5YR 4/6. Moist color is 5Y 5/2, 10YR 7/2 or 8/3, 7.5YR 5/8, or 2.5YR 4/6. Mottles have dry color of 10YR 8/1, 7.5YR 6/6, 5YR 6/8, or 2.5YR 4/8 and moist color of 7.5YR 5/8, 7/2, or 7/6; 5YR 5/8; or

2.5YR 4/8 or 6/4. The reticulate pattern of mottling is similar to that in the Bt horizon. The C horizon is sandy clay loam or sandy loam. The content of clay ranges from 15 to 25 percent. The content of soft basic plinthite ranges from 5 to 45 percent. Base saturation ranges from 5 to 35 percent.

Fishrock Series

The Fishrock series consists of well drained soils that are shallow to bedrock. These soils formed in material weathered from sandstone or mudstone. They are on ridgetops and the upper side slopes of coastal hills and mountains. Slopes range from 2 to 30 percent. The mean annual precipitation is about 50 inches, and the mean annual air temperature is about 55 degrees F.

These soils are classified as clayey, mixed, mesic Lithic Haploxerults.

Typical pedon of Fishrock loam, in an area of Fishrock-Iversen complex, 2 to 15 percent slopes; 950 feet south and 250 feet west of the northeast corner of sec. 8, T. 11 N., R. 15 W., MDBM, Gualala quadrangle:

Oi—1 inch to 0; fresh litter of manzanita and huckleberry leaves and twigs.

A—0 to 2 inches; brown (10YR 5/3) loam, dark yellowish brown (10YR 4/4) moist; strong medium and coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and common fine and medium roots; common very fine, fine, and medium tubular and common very fine interstitial pores; very strongly acid (pH 4.8); clear smooth boundary.

Bt1—2 to 7 inches; reddish yellow (7.5YR 6/6) clay loam, strong brown (7.5YR 4/6) moist; strong fine, medium, and coarse subangular blocky structure; slightly hard, friable, slightly sticky and plastic; common very fine, fine, and medium roots; many very fine, fine, and medium tubular pores; common thin and moderately thick clay films on faces of peds and lining pores; extremely acid (pH 4.4); clear smooth boundary.

Bt2—7 to 12 inches; light yellowish brown (10YR 6/4) clay, brownish yellow (10YR 6/6) moist; strong medium and coarse subangular blocky structure; very hard, firm, very sticky and plastic; common fine and medium roots; common very fine tubular and interstitial pores; many moderately thick and thick clay films on faces of peds and lining pores; 10 percent hard angular and subangular gravel; extremely acid (pH 4.2); clear smooth boundary.

R—12 inches; hard, fractured sandstone; fractures are 2 to 6 centimeters apart and 1 to 2 millimeters wide; few fine and medium roots and many thick clay films along fracture planes.

The depth to hard bedrock ranges from 10 to 20 inches. The mean annual soil temperature ranges from 54 to 59 degrees F. The soil between the depth of 5 inches and bedrock is moist in all parts from November 1 to June 1 and is dry in all parts from July 1 to October 1 in most years. Base saturation ranges from 15 to 35 percent throughout. Reaction is extremely acid or very strongly acid.

The A horizon has color of 10YR 5/3, 5/4, or 6/4. Moist color is 10YR 3/3, 4/3, 4/4, or 5/4 or 7.5YR 4/4 or 4/6. The content of clay ranges from 15 to 27 percent. The content of gravel ranges from 0 to 5 percent.

The Bt horizon has color of 10YR 6/4 or 7.5YR 6/6 or 7/6. Moist color is 10YR 5/4, 5/8, or 6/6 or 7.5YR 4/4, 4/6, 5/6, or 6/6. The texture is clay loam or clay that contains 27 to 50 percent clay. The content of gravel ranges from 0 to 15 percent.

Flumeville Series

The Flumeville series consists of very deep, poorly drained soils that formed in alluvium derived from mixed rock sources. These soils are on marine terraces. Slopes range from 0 to 15 percent. The mean annual precipitation is about 40 inches, and the mean annual air temperature is about 53 degrees.

These soils are classified as fine, mixed, isomesic Typic Argiaquolls.

Typical pedon of Flumeville clay loam, 0 to 5 percent slopes, 900 feet north and 50 feet east of the southwest corner of sec. 6, T. 13 N., R. 16 W., MDBM, Mallo Pass Creek quadrangle:

A—0 to 11 inches; dark gray (10YR 4/1) clay loam, very dark grayish brown (10YR 3/2) moist; strong fine and medium subangular blocky structure; slightly hard, friable, sticky and plastic; many very fine roots; many very fine tubular and interstitial and common fine tubular pores; moderately acid (pH 5.8); clear wavy boundary.

Bt1—11 to 19 inches; grayish brown (10YR 5/2) clay loam, very dark brown (10YR 2/2) moist; common fine and medium prominent reddish brown (5YR 4/4) mottles, dark reddish brown (5YR 2.5/2) moist; strong medium and coarse subangular blocky structure; slightly hard, friable, sticky and very plastic; common very fine roots; many very fine tubular pores; few thin clay films

lining pores; slightly acid (pH 6.2); clear wavy boundary.

Bt2—19 to 26 inches; grayish brown (10YR 5/2) clay, very dark grayish brown (10YR 3/2) moist; common fine and medium prominent strong brown (7.5YR 5/6) mottles, strong brown (7.5YR 5/6) moist; strong medium and coarse subangular blocky structure; hard, firm, very sticky and very plastic; few very fine roots; many very fine tubular pores; few moderately thick clay films on faces of peds and lining pores; slightly acid (pH 6.2); clear wavy boundary.

Bt3—26 to 33 inches; light gray (10YR 7/2) clay, grayish brown (10YR 5/2) moist; common fine and medium prominent strong brown (7.5YR 5/8) mottles, strong brown (7.5YR 5/8) moist; strong coarse angular blocky structure; very hard, very firm, very sticky and very plastic; few very fine roots; common very fine tubular pores; few moderately thick clay films on faces of peds and lining pores; moderately acid (pH 5.8); clear wavy boundary.

Bt4—33 to 55 inches; white (5Y 8/2) clay, pale yellow (5Y 7/3) moist; common fine and medium prominent strong brown (7.5YR 5/8) mottles, strong brown (7.5YR 5/8) moist; moderate coarse prismatic structure; extremely hard, very firm, very sticky and very plastic; few very fine roots; few very fine tubular pores; few thin clay films on faces of peds and lining pores; very strongly acid (pH 4.8); gradual wavy boundary.

Bt5—55 to 62 inches; white (5Y 8/2) clay, light gray (5Y 7/2) moist; few fine and medium prominent strong brown (7.5YR 5/8) mottles, strong brown (7.5YR 5/8) moist; massive; extremely hard, very firm, very sticky and very plastic; few very fine roots; few very fine tubular pores; few thin clay films lining pores; very strongly acid (pH 5.0).

The depth to bedrock is more than 60 inches. The mollic epipedon is 20 to 40 inches thick and has 1 to 7 percent organic matter. The mean annual soil temperature ranges from 50 to 56 degrees F. The difference between the mean summer and mean winter soil temperatures ranges from 6 to 9 degrees F. The soil between the depths of 5 and 16 inches is moist in all parts from November 1 to June 1. The moisture control section is dry in some or all parts from July 1 to October 1 in most years. The soil is saturated with water for long periods following episodes of heavy rain from December through April. The saturated zone starts between the depths of 12 and 30 inches and extends to a depth of more than 60 inches. The soil is not saturated above a depth of 60 inches from summer through early fall.

The A horizon has color of 2.5Y 4/2 or 5/2 or 10YR 4/1, 4/2, 5/1, or 5/2. Moist color is 10YR 2/1, 3/1, 2/2, or 3/2. The content of clay ranges from 27 to 35 percent. Base saturation ranges from 50 to 70 percent. Reaction ranges from moderately acid to neutral.

The Bt horizon has color of 5Y 7/1, 7/2, or 8/2; 2.5Y 7/2; or 10YR 5/1, 5/2, 6/2, 7/1, or 7/2. Moist color is 5Y 7/2 or 7/3; 2.5Y 6/2; or 10YR 2/2, 3/2, 4/2, or 5/2. Mottles have dry color of 10YR 5/6, 5YR 4/4, or 7.5YR 5/6 or 5/8 and moist color of 10YR 5/6, 5YR 2.5/2, or 7.5YR 5/6 or 5/8. Mottling begins between the depths of 10 and 30 inches and continues to a depth of more than 60 inches. The Bt horizon is clay loam or clay. The content of clay ranges from 35 to 55 percent. The content of hard gravel ranges from 0 to 10 percent. Base saturation ranges from 70 to 100 percent. Reaction ranges from very strongly acid to neutral.

Frenchman Series

The Frenchman series consists of very deep, well drained soils that formed in alluvium derived from sandstone. These soils are on river terraces. Slopes range from 0 to 9 percent. The mean annual precipitation is about 60 inches, and the mean annual air temperature is about 54 degrees F.

These soils are classified as loamy-skeletal, mixed, isomesic Ustic Dystropepts.

Typical pedon of Frenchman very gravelly sandy loam, in an area of Gschwend-Frenchman complex, 0 to 9 percent slopes; 1,600 feet north and 2,400 feet east of the southwest corner of sec. 2, T. 16 N., R. 15 W., MDBM, Comptche Southeast quadrangle:

Oi—2 inches to 0; decomposed and partially decomposed litter of Douglas-fir and tanoak leaves and twigs.

A—0 to 10 inches; light yellowish brown (10YR 6/4) very gravelly sandy loam, yellowish brown (10YR 5/4) moist; weak very fine and fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine and fine and few medium and coarse roots; many very fine and fine interstitial and few fine tubular pores; 45 percent hard rounded and subrounded sandstone gravel and 5 percent hard rounded sandstone cobbles; strongly acid (pH 5.4); clear wavy boundary.

Bw1—10 to 25 inches; light yellowish brown (10YR 6/4) very gravelly sandy loam, dark yellowish brown (10YR 4/6) moist; weak fine and medium subangular blocky structure; soft, very friable,

nonsticky and nonplastic; common very fine, fine, medium, and coarse roots; many very fine and fine interstitial and few fine tubular pores; 35 percent hard rounded and subrounded sandstone gravel and 10 percent hard rounded sandstone cobbles; moderately acid (pH 5.6); clear wavy boundary.

Bw2—25 to 30 inches; light yellowish brown (10YR 6/4) very gravelly sandy loam, dark yellowish brown (10YR 4/6) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and few medium and coarse roots; common fine interstitial and few very fine tubular pores; 30 percent hard rounded and subrounded sandstone gravel and 10 percent hard rounded sandstone cobbles; moderately acid (pH 5.6); abrupt wavy boundary.

2C1—30 to 42 inches; yellowish brown (10YR 5/4) extremely gravelly sand, dark yellowish brown (10YR 4/4) moist; single grained; loose, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; 50 percent hard rounded and subrounded sandstone gravel and 20 percent hard rounded sandstone cobbles; moderately acid (pH 5.8); clear wavy boundary.

2C2—42 to 62 inches; light yellowish brown (2.5Y 6/4) extremely cobbly loamy sand, dark yellowish brown (10YR 4/4) moist; single grained; loose, nonsticky and nonplastic; few very fine and fine roots; common very fine interstitial pores; 55 percent hard rounded and subrounded sandstone gravel and 30 percent hard rounded sandstone cobbles; moderately acid (pH 5.8).

The depth to bedrock is more than 60 inches. The mean annual soil temperature ranges from 52 to 56 degrees F. The difference between the mean summer and mean winter soil temperatures ranges from 5 to 9 degrees F. The soil between the depths of 14 and about 110 inches is moist in all parts from November 1 until June 15 and is dry in some or all parts from July 15 to October 1 in most years.

The A horizon has color of 10YR 4/2, 4/3, 5/3, 5/4, or 6/4. Moist color is 10YR 2/2, 3/2, 3/3, 4/3, 4/4, or 5/4. The content of clay ranges from 10 to 20 percent. The content of gravel ranges from 35 to 50 percent. The content of cobbles ranges from 0 to 10 percent. Base saturation ranges from 15 to 45 percent. Reaction is strongly acid or moderately acid.

The Bw horizon has color of 10YR 5/3, 5/4, 6/4, 7/3, or 7/4. Moist color is 10YR 4/3, 4/4, 4/6, 5/4, or 5/6. This horizon is stratified very gravelly sandy loam, very gravelly loam, or very gravelly sandy clay loam. The content of clay ranges from 10 to 25 percent. The content of gravel ranges from 30 to 50 percent, and the content of cobbles ranges from 5 to 10 percent. Base saturation ranges from 10 to 40 percent. Reaction ranges from very strongly acid to moderately acid.

The C horizon has color of 10YR 5/4, 6/4, 6/6, 7/3, or 7/4 or 2.5Y 6/4. Moist color is 10YR 4/4, 5/4, 5/6, or 6/4. This horizon is stratified with the very gravelly, very cobbly, extremely gravelly, or extremely cobbly analogs of sand, loamy sand, or sandy loam. The content of clay ranges from 5 to 15 percent. The content of gravel ranges from 25 to 80 percent, and the content of cobbles ranges from 10 to 40 percent. The total content of coarse fragments ranges from 35 to 90 percent. Base saturation ranges from 10 to 35 percent. Reaction is strongly acid or moderately acid.

Garcia Series

The Garcia series consists of well drained soils that are moderately deep to bedrock. These soils formed in material weathered from sandstone. They are on hills and mountains. Slopes range from 15 to 75 percent. The mean annual precipitation is about 60 inches, and the mean annual air temperature is about 56 degrees F.

These soils are classified as fine-loamy, mixed, mesic Ultic Argixerolls.

Typical pedon of Garcia loam, in an area of Squawrock-Garcia-Witherell complex, 50 to 75 percent slopes; 2,100 feet south and 2,000 feet west of the northeast corner of sec. 14, T. 12 N., R. 14 W., MDBM, Ornbaun Valley Northwest quadrangle:

Oi—1 inch to 0; undecomposed litter of tanoak and Douglas-fir.

A1—0 to 4 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; strong fine and medium granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine and few medium roots; many very fine and common fine tubular and interstitial pores; 5 percent hard subangular gravel; moderately acid (pH 5.7); clear wavy boundary.

A2—4 to 11 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; strong fine and medium granular structure; soft, very friable, slightly sticky and slightly plastic; common very fine and fine and few medium and coarse roots; many very fine and common fine tubular and interstitial pores; 10 percent hard subangular gravel; moderately acid (pH 5.7); clear wavy boundary.

BA—11 to 19 inches; yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 3/4) moist; moderate very fine and fine subangular blocky structure; slightly hard, friable, sticky and plastic; common very fine and fine and few coarse roots; many very fine and fine and few medium tubular and interstitial pores; few thin silt coatings on faces of peds; 14 percent hard subangular gravel; slightly acid (pH 6.2); gradual wavy boundary.

Bt—19 to 28 inches; very pale brown (10YR 7/4) gravelly clay loam, dark yellowish brown (10YR 4/6) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, sticky and plastic; common very fine and fine and few medium and coarse roots; many very fine and fine and few medium tubular and interstitial pores; few thin clay films on faces of peds and lining pores; few thin silt coatings on faces of peds; 30 percent hard subangular gravel; moderately acid (pH 6.0); abrupt irregular boundary.

R—28 to 40 inches; hard, fractured sandstone; fractures are 2 to 15 centimeters apart and less than 1 millimeter in width; few very fine, fine, medium, and coarse roots along fractures; many thin and moderately thick clay films on fracture faces; black (10YR 4/0) stains coating interior fracture faces; rock does not slake in water.

The depth to hard bedrock ranges from 20 to 40 inches. The mollic epipedon is 7 to 15 inches thick and has 3 to 8 percent organic matter. The mean annual soil temperature ranges from 54 to 59 degrees F. The soil between the depths of 7 and 21 inches is moist in all parts from November 1 to May 15 and is dry in all parts from July 1 to October 1 in most years. Reaction ranges from strongly acid to slightly acid.

The A horizon has color of 10YR 4/2, 4/3, or 5/3. Moist color is 10YR 2/2 or 3/2. The content of clay ranges from 15 to 25 percent. The content of gravel ranges from 5 to 15 percent. Base saturation ranges from 50 to 70 percent.

The Bt horizon has color of 10YR 5/4, 6/3, 6/4, or 7/4. Moist color is 10YR 3/4, 4/4, or 4/6. The texture is loam, gravelly loam, clay loam, or gravelly clay loam. The content of clay ranges from 20 to 35 percent. The content of gravel ranges from 10 to 30 percent. Base saturation ranges from 65 to 90 percent.

Gibney Series

The Gibney series consists of very deep, somewhat poorly drained soils that formed in marine sediments. These soils are on marine terraces. Slopes range from 2 to 15 percent. The mean annual precipitation is about 50 inches, and the mean annual air temperature is about 53 degrees F.

These soils are classified as clayey, mixed, isomesic Typic Hapludults.

Typical pedon of Gibney loam, in an area of Shinglemill-Gibney complex, 2 to 9 percent slopes; 400 feet north and 2,600 feet east of the southwest corner of sec. 21, T. 17 N., R. 17 W., MDBM, Mendocino quadrangle:

Oi—3 inches to 0; litter of bishop pine and manzanita.

A1—0 to 4 inches; pale yellow (2.5Y 7/4) loam, yellowish brown (10YR 5/4) moist; moderate fine and medium subangular blocky structure parting to weak fine granular; soft, very friable, sticky and slightly plastic; many very fine and fine and common medium and coarse roots; common very fine and fine tubular and common very fine interstitial pores; 10 percent hard subrounded dark reddish brown (5YR 2.5/2) and black (5YR 2.5/1) nodules (2 to 30 millimeters); moderately acid (pH 5.6); clear wavy boundary.

A2—4 to 9 inches; pale yellow (2.5Y 7/4) loam, yellowish brown (10YR 5/4) moist; moderate fine and medium subangular blocky structure parting to weak fine granular; slightly hard, very friable, sticky and plastic; common very fine, fine, medium, and coarse roots; common very fine and fine tubular and common very fine interstitial pores; 5 percent hard subrounded dark reddish brown (5YR 2.5/2) and black (5YR 2.5/1) nodules (2 to 10 millimeters); moderately acid (pH 5.9); clear wavy boundary.

Bt1—9 to 15 inches; brownish yellow (10YR 6/6) sandy clay loam, yellowish brown (10YR 5/6) moist; moderate very fine, fine, medium, and coarse subangular blocky structure; slightly hard, firm, sticky and plastic; common very fine and fine and few medium roots; common very fine tubular and interstitial pores; few thin clay films on faces of peds and bridging mineral grains; extremely acid (pH 4.3); gradual wavy boundary.

Bt2—15 to 29 inches; yellowish brown (10YR 5/8) clay loam, yellowish brown (10YR 5/6) moist; strong fine, medium, and coarse subangular blocky structure; hard, firm, sticky and plastic; few very fine and fine roots; common very fine tubular and interstitial pores; common thin and moderately thick clay films on faces of peds, lining pores, and bridging mineral grains; extremely acid (pH 4.3); gradual wavy boundary.

Btv1—29 to 40 inches; yellowish brown (10YR 5/8) clay, yellowish brown (10YR 5/6) moist; common

medium and coarse distinct strong brown (7.5YR 5/6) mottles, strong brown (7.5YR 5/6) moist; common medium prominent red (2.5YR 4/8) mottles, red (2.5YR 4/6) moist; strong fine, medium, and coarse angular blocky structure; hard, firm, very sticky and plastic; few very fine, fine, and medium roots; few very fine tubular and interstitial pores; many thin and moderately thick clay films on faces of peds, lining pores, and bridging mineral grains; most red color is soft natural plinthite that is firm when moist; 5 percent hard subrounded yellowish red (5YR 4/6) nodules (20 to 60 millimeters); very strongly acid (pH 4.5); gradual wavy boundary.

Btv2—40 to 55 inches; brownish yellow (10YR 6/6) clay, yellowish brown (10YR 5/6) moist; many medium and coarse distinct strong brown (7.5YR 5/6) mottles, strong brown (7.5YR 5/6) moist; common medium and coarse prominent red (2.5YR 4/8) mottles, red (2.5YR 4/8) moist; common medium and coarse prominent light gray (2.5Y 7/2) mottles, light yellowish brown (2.5Y 6/4) moist; strong fine, medium, and coarse angular blocky structure; hard, firm, sticky and plastic; few very fine and fine roots; few very fine tubular and interstitial pores; many thin and moderately thick clay films on faces of peds, lining pores, and bridging mineral grains; most red color is soft natural plinthite that is firm when moist; 10 percent hard platelike yellowish red (5YR 4/6) nodules that are 5 to 10 millimeters thick, 20 to 100 millimeters long, and 10 to 40 millimeters wide; extremely acid (pH 4.1); abrupt irregular boundary.

Btv3—55 to 63 inches; light gray (2.5Y 7/2) sandy clay loam, light brownish gray (2.5Y 6/2) moist; common coarse prominent strong brown (7.5YR 5/8) mottles, strong brown (7.5YR 5/6) moist; common medium prominent red (2.5YR 4/8) mottles, yellowish red (5YR 4/6) moist; massive; slightly hard, firm, slightly sticky and slightly plastic; few very fine roots; common very fine interstitial and few very fine tubular pores; few moderately thick clay films on nodules; most red color is soft natural plinthite that is firm when moist; 10 percent hard and very hard subangular yellowish red (5YR 4/6) nodules (50 to 200 millimeters); very strongly acid (pH 4.5).

The depth to bedrock is more than 60 inches. The mean annual soil temperature is 50 to 56 degrees F. The difference between the mean summer and mean winter soil temperatures ranges from 6 to 9 degrees F. The soil between the depths of 9 and 21 inches is moist in all parts from November 1 to August 1 and is dry in some part from September 1 to October 1 in most years. The soil is saturated with water for brief or long periods following episodes of heavy rain from December through April. The saturated zone starts between the depths of 30 and 48 inches and extends to a depth of more than 60 inches. The soil is not saturated above a depth of 60 inches from summer through early fall.

The A horizon has color of 2.5Y 6/4, 7/2, or 7/4 or 10YR 6/2, 6/3, 6/4, or 7/2. Moist color is 2.5Y 5/2 or 6/4 or 10YR 4/3, 4/4, 5/2, 5/3, 5/4, or 6/3. The content of clay ranges from 7 to 15 percent. The content of nodules ranges from 0 to 15 percent. Reaction ranges from very strongly acid to moderately acid.

The Bt horizon has color of 5Y 7/2; 2.5Y 7/2; 10YR 5/6, 5/8, 6/4, 6/6, or 7/3; or N 7/0. Moist colors are 5Y 6/2 or 6/3; 2.5Y 6/2; 10YR 4/6, 5/4, 5/6, or 5/8; or N 5/0. Mottles have dry color of 2.5Y 7/2; 10YR 6/6, 7/1, or 8/1; 7.5YR 5/6 or 5/8; or 2.5YR 4/8 and moist color of 2.5Y 6/4; 10YR 5/4, 6/8, 7/2, or 8/1; 7.5YR 5/6 or 5/8; 5YR 4/6; or 2.5YR 4/6 or 4/8. Grayish colors occur with brownish and reddish colors in a regular reticulate pattern beginning within a depth of 30 to 48 inches. The Bt horizon is clay, sandy clay, clay loam, or sandy clay loam. The content of clay ranges from 30 to 60 percent. The content of soft plinthite ranges from 0 to 20 percent. The content of nodules ranges from 0 to 15 percent. Base saturation ranges from 5 to 30 percent. Reaction is extremely acid or very strongly acid.

Gibwell Series

The Gibwell series consists of very deep, well drained soils that formed in eolian sands. These soils are on stabilized sand dunes on marine terraces. Slopes range from 2 to 15 percent. The mean annual precipitation is about 50 inches, and the mean annual air temperature is about 53 degrees F.

These soils are classified as clayey, mixed, isomesic Typic Hapludults.

Typical pedon of Gibwell loamy sand, 9 to 15 percent slopes, 3,500 feet south and 700 feet west of the northeast corner of sec. 32, T. 18 N., R. 17 W., MDBM, Fort Bragg quadrangle:

Oi—2 inches to 0; litter of bishop pine and tanoak leaves and twigs.

E1—0 to 3 inches; gray (10YR 5/1) loamy sand, dark gray (10YR 4/1) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; slightly smeary; common very fine and fine and few medium roots; common very fine interstitial and very fine,

fine, and medium tubular pores; very strongly acid (pH 4.5); clear wavy boundary.

E2—3 to 7 inches; light gray (10YR 7/2) loamy sand, grayish brown (10YR 5/2) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; slightly smeary; common very fine and few fine and medium roots; common very fine interstitial and tubular and few fine and medium tubular pores; extremely acid (pH 4.3); clear wavy boundary.

E3—7 to 12 inches; variegated light gray (2.5Y 7/2) and very pale brown (10YR 7/4) loamy sand, grayish brown (2.5Y 5/2) and yellowish brown (10YR 5/4) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and few medium roots; common very fine and fine tubular and very fine interstitial pores; strongly acid (pH 5.5); abrupt wavy boundary.

Bt/E—12 to 18 inches; variegated brownish yellow (10YR 6/6) and light gray (10YR 7/2) clay loam, dark yellowish brown (10YR 4/4) and grayish brown (10YR 5/2) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, sticky and plastic; common very fine, fine, and medium and few coarse roots; common very fine tubular and interstitial pores; few thin clay films bridging sand grains; strongly acid (pH 5.5); abrupt wavy boundary.

Bt1—18 to 26 inches; yellowish brown (10YR 5/8) clay, dark yellowish brown (10YR 4/6) moist; strong medium and coarse subangular blocky structure; hard, very firm, sticky and plastic; common fine and medium and few coarse roots; common very fine and fine tubular and few very fine interstitial pores; many thin and moderately thick clay films on faces of peds and lining pores; strongly acid (pH 5.5); clear wavy boundary.

Bt2—26 to 42 inches; strong brown (7.5YR 5/8) sandy clay loam, strong brown (7.5YR 5/6) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; common fine interstitial and few fine tubular pores; few thin clay films bridging sand grains; very strongly acid (pH 5.0); abrupt wavy boundary.

C—42 to 65 inches; pale yellow (2.5Y 7/4) loamy sand, light olive brown (2.5Y 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots; common very fine interstitial pores; strongly acid (pH 5.5).

The depth to bedrock is more than 80 inches. The mean annual soil temperature ranges from 50 to 56 degrees F. The difference between the mean winter and mean summer soil temperatures ranges from 6 to 9 degrees F. The soil between the depths of 13 and 25 inches is moist in all parts from November 1 to August 15 and is dry in some part from September 1 to October 1 in most years. Base saturation ranges from 5 to 30 percent throughout. Reaction ranges from extremely acid to strongly acid.

The E horizon has color of 2.5Y 6/2 or 7/2 or 10YR 5/1, 6/1, 6/2, 7/2, 7/3, 7/4, or 8/1. Moist color is 2.5Y 5/2 or 10YR 3/1, 4/1, 4/2, 5/1, 5/2, 5/3, 5/4, or 6/2. The content of clay ranges from 5 to 15 percent.

The Bt horizon has color of 10YR 5/8, 6/6, or 6/8 or 7.5YR 5/6, 5/8, or 6/6. Moist color is 10YR 4/4, 4/6, 5/6, or 5/8 or 7.5YR 4/6, 5/6, or 5/8. The texture is sandy clay loam, clay loam, clay, or sandy clay that contains 25 to 55 percent clay.

The C horizon has color of 2.5Y 7/4; 10YR 6/6, 7/4, or 7/6; or 7.5YR 6/6. Moist color is 2.5Y 5/4, 10YR 5/4 or 5/6, 7.5YR 5/4 or 5/6, or 5YR 4/6. The texture is sandy loam, loamy sand, or sand that contains 5 to 15 percent clay.

Glenblair Series

The Glenblair series consists of well drained soils that are deep or very deep to bedrock. These soils formed in material weathered from metamorphosed basalt. They are on hills. Slopes range from 9 to 75 percent. The mean annual precipitation is about 55 inches, and the mean annual air temperature is about 53 degrees F.

These soils are classified as fine-loamy, oxidic, isomesic Typic Argiudolls.

Typical pedon of Glenblair gravelly loam, 50 to 75 percent slopes, 250 feet south and 600 feet west of the northeast corner of sec. 10, T. 18 N., R. 17 W., MDBM, Comptche Northwest quadrangle:

Oi—2 inches to 0; redwood litter.

A—0 to 10 inches; dark reddish gray (5YR 4/2) gravelly loam, dark reddish brown (5YR 3/2) moist; strong very fine and fine granular structure; hard, very friable, slightly sticky and slightly plastic; common medium and few very fine and fine roots; common very fine and few fine interstitial pores; 20 percent gravel; neutral (pH 7.0); clear irregular boundary.

Bt1—10 to 22 inches; dark reddish gray (5YR 4/2) gravelly clay loam, dark reddish brown (5YR 3/2) moist; moderate medium and coarse granular structure; hard, very friable, slightly sticky and plastic; common medium and coarse and few very fine and fine roots; common very fine and few fine interstitial pores; common thin clay films on faces of peds and lining pores; 25 percent

gravel and 5 percent cobbles; slightly acid (pH 6.2); gradual wavy boundary.

Bt2—22 to 39 inches; dark reddish gray (5YR 4/2) gravelly clay loam, dark reddish brown (5YR 3/2) moist; moderate medium and coarse subangular blocky structure parting to moderate fine and medium granular; hard, friable, slightly sticky and plastic; common medium and coarse and few fine roots; common very fine and few fine interstitial pores; common thin clay films on faces of peds and lining pores; 20 percent gravel and 10 percent cobbles; slightly acid (pH 6.2); gradual wavy boundary.

Bt3—39 to 62 inches; dark reddish gray (5YR 4/2) very gravelly clay loam, dark reddish brown (5YR 3/2) moist; moderate medium and coarse subangular blocky structure parting to moderate fine and medium granular; hard, friable, slightly sticky and plastic; common coarse and few fine and medium roots; common very fine and few fine interstitial pores; many moderately thick clay films on faces of peds and lining pores; 30 percent gravel and 10 percent cobbles; slightly acid (pH 6.1); abrupt irregular boundary.

R—62 to 67 inches; dark reddish gray (5YR 4/2), hard, fractured (meta-basalt) bedrock; fractures are 5 to 8 centimeters apart and are 1 to 5 millimeters wide; continuous moderately thick clay films on fracture faces.

The depth to hard bedrock ranges from 40 to 70 inches. The mollic epipedon is 20 to 62 inches thick and has 3 to 10 percent organic matter. The mean annual soil temperature ranges from 50 to 56 degrees F. The difference between the mean summer and mean winter soil temperatures ranges from 3 to 6 degrees F. The soil between the depths of 8 and 26 inches is moist in all parts from November 1 to August 15 and is dry in some part from September 1 to October 1 in most years. Base saturation ranges from 65 to 95 percent throughout.

The A horizon has color of 5YR 4/2 or 4/3 or 2.5YR 3/2. Moist color is 5YR 3/2 or 3/3 or 2.5YR 3/2. The content of gravel ranges from 15 to 25 percent. The content of clay ranges from 18 to 27 percent. Reaction is slightly acid or neutral.

The Bt horizon has color of 5YR 4/2, 4/3, or 5/3 or 2.5YR 4/2 or 4/4. Moist color is 5YR 3/2 or 3/3 or 2.5YR 3/2 or 3/3. The texture is gravelly clay loam, very gravelly clay loam, gravelly clay, or very gravelly clay that contains 27 to 45 percent clay. The content of gravel ranges from 15 to 50 percent. The content of cobbles ranges from 0 to 10 percent. Reaction is moderately acid or slightly acid.

Gschwend Series

The Gschwend series consists of very deep, well drained soils that formed in alluvium derived from sandstone. These soils are on river terraces. Slopes range from 0 to 9 percent. The mean annual precipitation is about 60 inches, and the mean annual air temperature is about 54 degrees F.

These soils are classified as fine-loamy, mixed, isomesic Ustic Dystropepts.

Typical pedon of Gschwend loam, in an area of Gschwend-Frenchman complex, 0 to 9 percent slopes; 3,200 feet south and 1,900 feet west of the northeast corner of sec. 3, T. 23 N., R. 17 W., MDBM, Noble Butte quadrangle:

Oi—1 inch to 0; partially decomposed litter of Douglas-fir and tanoak leaves and twigs.

A1—0 to 2 inches; dark grayish brown (10YR 4/2) loam, black (10YR 2/1) moist; strong fine granular structure; soft, very friable, slightly sticky and slightly plastic; common very fine and few fine and medium roots; few very fine tubular and common very fine and fine interstitial pores; 10 percent hard rounded sandstone gravel; moderately acid (pH 6.0); clear wavy boundary.

A2—2 to 12 inches; dark brown (10YR 4/3) loam, very dark brown (10YR 2/2) moist; moderate medium and coarse subangular blocky structure; soft, friable, slightly sticky and slightly plastic; few very fine and fine roots; common very fine interstitial and few fine tubular pores; 10 percent hard rounded sandstone gravel; moderately acid (pH 5.7); clear wavy boundary.

Bw—12 to 19 inches; yellowish brown (10YR 5/4), stratified sandy loam, dark brown (10YR 3/3) moist; weak medium and coarse subangular blocky structure; soft, friable, slightly sticky and slightly plastic; few very fine and fine roots; common very fine interstitial and few fine tubular pores; 10 percent hard rounded sandstone gravel; strongly acid (pH 5.5); gradual wavy boundary.

Bt—19 to 35 inches; light yellowish brown (10YR 6/4), stratified loam, dark yellowish brown (10YR 4/4) moist; weak fine and medium subangular blocky structure; soft, friable, slightly sticky and slightly plastic; few fine and medium roots; common very fine interstitial and few fine tubular pores; few thin clay films bridging sand grains and lining pores; 10 percent hard rounded sandstone gravel; strongly acid (pH 5.2); clear wavy boundary.

2C—35 to 61 inches; very pale brown (10YR 7/4) extremely gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; massive; soft, very

friable, nonsticky and nonplastic; few fine and medium roots; many very fine, fine, and medium interstitial pores; 60 percent hard rounded sandstone gravel and 10 percent hard rounded sandstone cobbles; strongly acid (pH 5.2).

The depth to bedrock is more than 60 inches. The mean annual soil temperature ranges from 53 to 56 degrees F. The soil between the depths of 7 and 22 inches is moist in all parts from November 1 to June 15 and is dry in some or all parts from July 15 to October 1 in most years. Base saturation ranges from 10 to 50 percent throughout.

The A horizon has color of 10YR 4/2, 4/3, 5/3, or 5/4. Moist color is 10YR 2/1, 2/2, 3/2, or 3/3. The content of clay ranges from 10 to 20 percent. The content of gravel ranges from 2 to 10 percent. Reaction is strongly acid or moderately acid.

The B horizon has color of 10YR 5/4, 6/3, 6/4, 7/3, or 7/4. Moist color is 10YR 3/3, 4/3, 4/4, 4/6, 5/3, 5/4, or 5/6. The texture is stratified sandy loam, loam, or sandy clay loam. The content of clay ranges from 10 to 30 percent. The content of gravel ranges from 2 to 15 percent. Reaction is strongly acid or very strongly acid.

The C horizon has color of 10YR 6/4, 6/6, 7/3, or 7/4. Moist color is 10YR 4/4, 5/4, 5/6, or 6/4. This horizon is stratified with the gravelly, very gravelly, or extremely gravelly analogs of sandy loam, loam, or sandy clay loam. The content of clay ranges from 5 to 27 percent. The content of gravel ranges from 15 to 90 percent. The content of cobbles ranges from 0 to 15 percent. The content of stones ranges from 0 to 5 percent. The total content of coarse fragments ranges from 15 to 90 percent. Reaction is very strongly acid or strongly acid.

Gube Series

The Gube series consists of well drained soils that are moderately deep to weathered bedrock. These soils formed in material weathered from sandstone. They are on mountains. Slopes range from 30 to 75 percent. The mean annual precipitation is about 60 inches, and the mean annual air temperature is about 55 degrees F.

These soils are classified as clayey, mixed, mesic Typic Haploxerults.

Typical pedon of Gube loam, in an area of Garcia-Snook-Gube complex, 50 to 75 percent slopes; 1,960 feet north and 2,000 feet east of the southwest corner of sec. 4, T. 13 N., R. 15 W., MDBM, Navarro Southeast quadrangle:

Oi—1/2 inch to 0; litter of manzanita leaves and twigs.

A—0 to 4 inches; very pale brown (10YR 7/3) loam, dark yellowish brown (10YR 4/4) moist; moderate fine subangular blocky structure; hard, firm, slightly sticky and slightly plastic; many very fine and fine roots; common very fine interstitial pores; 2 percent gravel; strongly acid (pH 5.4); clear wavy boundary.

Bt1—4 to 16 inches; very pale brown (10YR 7/4) clay loam, dark yellowish brown (10YR 4/4) moist; strong very fine and fine angular blocky structure; hard, firm, sticky and plastic; common very fine and coarse roots; many moderately thick yellowish red (5YR 5/6) clay films on faces of peds; 5 percent gravel; strongly acid (pH 5.2); gradual wavy boundary.

Bt2—16 to 30 inches; yellow (10YR 7/6) clay, yellowish brown (10YR 5/6) moist; strong fine and medium angular blocky structure; very hard, very firm, sticky and plastic; few fine and coarse roots, mainly along faces of peds; many moderately thick yellowish red (5YR 5/6) clay films on faces of peds; 5 percent gravel; very strongly acid (pH 5.0); clear wavy boundary.

Cr—30 to 33 inches; yellow (10YR 7/6), highly weathered sandstone that can easily be dug with a spade.

The depth to soft bedrock ranges from 20 to 40 inches. The mean annual soil temperature ranges from 54 to 59 degrees F. The soil between the depths of 6 and 17 inches is moist in all parts from November 1 to May 15 and is dry in all parts from June 1 to October 1 in most years. Base saturation ranges from 25 to 35 percent. Reaction is very strongly acid or strongly acid throughout.

The A horizon has color of 10YR 6/2, 6/3, or 7/3. Moist color is 10YR 3/4 or 4/4. The content of clay ranges from 18 to 25 percent.

The Bt horizon has color of 10YR 7/4 or 7/6. Moist color is 10YR 4/4, 5/4, or 5/6. The texture is clay loam or clay. The content of clay ranges from 30 to 45 percent. The content of gravel ranges from 2 to 10 percent.

Haploxeralfs

Haploxeralfs are very deep, poorly drained to well drained soils on dissected river terraces and terrace escarpments. These soils formed in alluvium derived from mixed rock sources. Slopes range from 0 to 50 percent. The mean annual precipitation is about 50 inches, and the mean annual air temperature is about 55 degrees F.

Reference pedon of Haploxeralfs, in an area of

Haploxeralfs-Argixerolls complex, 0 to 9 percent slopes; 1,900 feet south and 800 feet west of the northeast corner of sec. 15, T. 21 N., R. 15 W., MDBM, Cahto Peak quadrangle:

A1—0 to 7 inches; light yellowish brown (10YR 6/4) loam, dark brown (10YR 3/3) moist; weak fine and medium granular structure; slightly hard, friable, slightly sticky and nonplastic; few very fine roots; many very fine and fine tubular and interstitial pores; moderately acid (pH 5.8); clear smooth boundary.

A2—7 to 20 inches; light yellowish brown (10YR 6/4) loam, dark yellowish brown (10YR 3/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; few very fine roots; few very fine and fine tubular and interstitial pores; moderately acid (pH 5.8); clear smooth boundary.

Bt1—20 to 50 inches; light yellowish brown (10YR 6/4) clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine and fine tubular and interstitial pores; common moderately thick clay films on faces of peds and lining pores; moderately acid (pH 5.8); clear smooth boundary.

Bt2—50 to 62 inches; very pale brown (10YR 7/4) sandy clay loam, yellowish brown (10YR 5/6) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine tubular pores; few thin clay films on faces of peds and lining pores; moderately acid (pH 6.0).

The depth to bedrock is more than 60 inches. The mean annual soil temperature ranges from 55 to 59 degrees F. The soil between the depths of 6 and 18 inches is moist in all parts from November 1 through June 1. The moisture control section is dry in all parts from July 1 through October 1 in most years. Haploxeralfs, wet, are saturated with water for extended or brief periods from December through April. The partially saturated zone starts between the depths of 10 and 50 inches and extends to a depth of more than 60 inches. Other Haploxeralfs are not saturated during the winter months. Reaction is moderately acid or slightly acid throughout.

The A horizon has color of 10YR 4/3, 4/4, 5/3, 5/4, 6/3, or 6/4. Moist color is 10YR 3/2, 3/3, 3/4, 4/3, or 4/4. The texture is sandy loam, loam, or gravelly loam that contains 10 to 20 percent clay and 0 to 20 percent gravel.

The Bt horizon has color of 7.5YR 5/6 or 6/6 or 10YR 6/4, 6/6, 7/3, or 7/4. Moist color is 7.5YR 4/4, 4/6, or 5/6; 10YR 4/4, 4/6, 5/6, or 5/8; or 2.5Y 4/4, 5/2, or 5/4. The texture is loam, sandy loam, clay loam, or sandy clay loam or the gravelly or very gravelly analogs of these textures. The content of clay ranges from 20 to 40 percent, and the content of gravel ranges from 0 to 50 percent. Mottles with color of 2.5Y 8/2 or 8/4, 7.5YR 6/8, or 10YR 6/8 or 8/2 occur in the more poorly drained soils.

The C horizon, if it occurs, has color of 10YR 5/6, 6/4, or 6/6 or 7.5YR 5/6, 6/4, or 7/8. Moist color is 10YR 3/6, 4/4, 4/6, 5/4, or 5/6 or 7.5YR 4/4, 4/6, or 5/8. The texture is stratified very gravelly loam to extremely gravelly sandy loam, and the content of gravel ranges from 35 to 75 percent.

Harecreek Series

The Harecreek series consists of very deep, well drained soils that formed in eolian sands. These soils are on marine terraces. Slopes range from 2 to 9 percent. The mean annual precipitation is about 50 inches, and the mean annual temperature is about 53 degrees F.

These soils are classified as coarse-loamy, mixed, isomesic Typic Haplohumults.

Typical pedon of Harecreek sandy loam, 2 to 9 percent slopes, 1,100 feet south and 1,300 feet west of the northeast corner of sec. 30, T. 18 N., R. 17 W., MDBM, Fort Bragg quadrangle:

Oi—2 inches to 0; decomposing litter of redwood, Douglas-fir, and bishop pine.

A1—0 to 4 inches; gray (10YR 5/1) sandy loam, very dark gray (10YR 3/1) moist; weak fine, medium, and coarse subangular blocky structure; soft, very friable, slightly sticky and nonplastic; common very fine, fine, medium, and coarse roots; many very fine tubular and interstitial pores; moderately acid (pH 5.7); abrupt wavy boundary.

A2—4 to 8 inches; light brownish gray (10YR 6/2) sandy loam, dark grayish brown (10YR 4/2) moist; weak medium and coarse subangular blocky structure; soft, very friable, slightly sticky and nonplastic; common very fine, fine, medium, and coarse roots; common very fine interstitial and few very fine, fine, and medium tubular pores; slightly acid (pH 6.3); abrupt wavy boundary.

Bt1—8 to 12 inches; variegated light brownish gray (10YR 6/2) and pale brown (10YR 6/3) sandy loam, dark grayish brown (10YR 4/2) and brown (10YR 4/3) moist; moderate medium and coarse

angular blocky structure; hard, very friable, slightly sticky and slightly plastic; common very fine and fine and few medium roots; common very fine interstitial and very fine, fine, and medium tubular pores; common thin clay films bridging mineral grains and few moderately thick clay films on faces of peds and lining pores; 10 percent hard nodules (2 to 50 millimeters); brittle when moist; slightly acid (pH 6.5); gradual wavy boundary.

Bt2—12 to 16 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 4/3) moist; moderate fine, medium, and coarse subangular blocky structure; hard, friable, slightly sticky and nonplastic; common very fine and fine and few medium roots; common very fine interstitial and very fine, fine, and medium tubular pores; many thin clay films bridging mineral grains and few thin and moderately thick clay films on faces of peds and lining pores; 5 percent hard nodules (2 to 50 millimeters); slightly acid (pH 6.5); clear wavy boundary.

Bt3—16 to 23 inches; light yellowish brown (10YR 6/4) sandy clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium and coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine, fine, medium, and coarse roots; many very fine tubular and interstitial and few fine and medium tubular pores; few thin clay films bridging mineral grains and common thin and moderately thick clay films on faces of peds and lining pores; slightly acid (pH 6.2); clear wavy boundary.

Bt4—23 to 43 inches; strong brown (7.5YR 5/6) sandy loam, strong brown (7.5YR 4/6) moist; moderate medium, coarse, and very coarse angular blocky structure; slightly hard, friable, nonsticky and nonplastic; few very fine, fine, and medium roots; many very fine interstitial and very fine and fine tubular pores; few thin clay films bridging mineral grains and few thin clay films on peds and lining pores; strongly acid (pH 5.5); gradual wavy boundary.

C—43 to 63 inches; brownish yellow (10YR 6/6) sand, dark yellowish brown (10YR 4/6) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine interstitial and tubular pores; strongly acid (pH 5.5).

The depth to bedrock is more than 60 inches. The content of organic carbon in the upper cubic meter of the soil averages 0.8 to 1.0 percent. The mean annual soil temperature ranges from 50 to 56 degrees F. The difference between the mean summer and mean winter soil temperatures ranges from 3 to 6 degrees F. The soil between the depths of 8 and 19 inches is moist in all parts from November 1 to August 15 and is dry in some part from September 1 to October 1 in most years.

The A horizon has color of 10YR 4/1, 5/1, 5/2, 6/1, or 6/2. Moist color is 10YR 3/1, 4/1, 4/2, or 5/1. The content of clay ranges from 5 to 13 percent. Base saturation ranges from 20 to 35 percent. Reaction ranges from strongly acid to slightly acid.

The Bt horizon has color of 10YR 6/2, 6/3, or 6/4 or 7.5YR 5/6 or 6/6. Moist color is 10YR 4/2, 4/3, 4/4, 5/3, or 5/4 or 7.5YR 4/6 or 5/6. The texture is sandy loam or sandy clay loam that contains 10 to 23 percent clay. Base saturation ranges from 10 to 35 percent. Reaction is strongly acid or moderately acid.

The C horizon has color of 10YR 6/6, 7/4, or 7/6. Moist color is 10YR 4/6, 5/4, or 5/6. The texture is sand, loamy sand, or sandy loam that contains 5 to 13 percent clay. Base saturation ranges from 10 to 35 percent. Reaction is very strongly acid or strongly acid.

Havensneck Series

The Havensneck series consists of well drained soils that are moderately deep to weathered bedrock. These soils formed in material weathered from interlayered sandstone and shale. They are on ridgetops and the upper side slopes of coastal hills and mountains. Slopes range from 2 to 30 percent. The mean annual precipitation is about 50 inches, and the mean annual air temperature is about 54 degrees F.

These soils are classified as fine-loamy, mixed, isomesic Typic Haplustults.

Typical pedon of Havensneck sandy loam, 15 to 30 percent slopes, 650 feet south and 2,025 feet west of the northeast corner of sec. 21, T. 12 N., R. 16 W., MDBM, Point Arena quadrangle:

Oi—2 inches to 0; litter of tanoak, bishop pine, and manzanita.

A1—0 to 3 inches; yellowish brown (10YR 5/4) sandy loam, dark yellowish brown (10YR 4/4) moist; moderate fine and medium granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; many very fine interstitial and common very fine tubular pores; strongly acid (pH 5.5); clear wavy boundary.

A2—3 to 7 inches; pale brown (10YR 6/3) sandy loam, yellowish brown (10YR 5/4) moist; moderate fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; many very fine tubular

and interstitial pores; strongly acid (pH 5.5); clear wavy boundary.

Bw—7 to 14 inches; pink (7.5YR 7/4) sandy loam, strong brown (7.5YR 4/6) moist; weak fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine tubular and interstitial pores; very strongly acid (pH 4.8); clear wavy boundary.

Bt1—14 to 21 inches; pink (7.5YR 7/4) sandy loam, strong brown (7.5YR 5/6) moist; massive; slightly hard, friable, nonsticky and nonplastic; few very fine and fine roots; many very fine tubular and interstitial pores; few thin clay films bridging sand grains; very strongly acid (pH 4.8); clear wavy boundary.

Bt2—21 to 32 inches; reddish yellow (7.5YR 6/6) sandy clay loam, strong brown (7.5YR 5/8) moist; strong fine and medium subangular blocky structure; very hard, firm, slightly sticky and slightly plastic; few very fine and fine roots; few very fine tubular and interstitial pores; many moderately thick clay films on faces of peds and lining pores; extremely acid (pH 4.3); abrupt wavy boundary.

Cr—32 to 34 inches; soft, interlayered coarse grained sandstone and shale.

The depth to soft bedrock ranges from 20 to 40 inches. The mean annual soil temperature ranges from 53 to 57 degrees F. The difference between the mean summer and mean winter soil temperatures ranges from 6 to 9 degrees F. The soil between the depths of 9 and 25 inches, or between 9 inches and the paralithic contact if it is at a depth of less than 25 inches, is moist in all parts from November 1 to June 1 and is dry in some or all parts from June 1 to November 1 in most years.

The A horizon has color of 10YR 5/3, 5/4, 5/6, 6/2, 6/3, or 6/4 or 2.5Y 6/3 or 6/4. Moist color is 10YR 4/4, 5/3, or 5/4 or 2.5Y 5/4 or 6/2. The content of clay ranges from 10 to 15 percent. Base saturation ranges from 30 to 45 percent. Reaction is strongly acid or very strongly acid.

The B horizon has color of 7.5YR 6/4, 6/6, 7/4, or 7/6. Moist color is 7.5YR 4/6, 5/6, 5/8, 6/6, or 6/8. The content of clay ranges from 10 to 25 percent. The texture is sandy loam or sandy clay loam. Base saturation ranges from 15 to 30 percent. Reaction is extremely acid or very strongly acid.

Heeser Series

The Heeser series consists of very deep, somewhat excessively drained soils that formed in eolian sands. These soils are on marine terraces. Slopes range from 0 to 15 percent. The mean annual precipitation is about 40 inches, and the mean annual temperature is about 53 degrees F.

These soils are classified as coarse-loamy, mixed, isomesic Ustic Humitropepts.

Typical pedon of Heeser sandy loam, 2 to 15 percent slopes, 500 feet south and 2,500 feet west of the northeast corner of sec. 30, T. 17 N., R. 17 W., MDBM, Mendocino quadrangle:

A1—0 to 3 inches; very dark grayish brown (10YR 3/2) sandy loam, black (10YR 2/1) moist; moderate very fine, fine, and medium granular structure; soft, very friable, slightly sticky and nonplastic; many very fine roots; many very fine and fine interstitial and few fine tubular pores; strongly acid (pH 5.5); abrupt smooth boundary.

A2—3 to 7 inches; very dark grayish brown (10YR 3/2) sandy loam, black (10YR 2/1) moist; moderate fine and medium subangular blocky structure; soft, very friable, slightly sticky and nonplastic; common very fine and few fine and medium roots; many very fine interstitial and few fine tubular pores; strongly acid (pH 5.5); clear wavy boundary.

A3—7 to 13 inches; dark brown (10YR 3/3) sandy loam, very dark brown (10YR 2/2) moist; moderate fine and medium subangular blocky structure; soft, very friable, slightly sticky and nonplastic; common very fine and few fine and medium roots; common very fine interstitial pores; strongly acid (pH 5.5); clear wavy boundary.

A4—13 to 23 inches; dark brown (10YR 3/3) sandy loam, very dark brown (10YR 2/2) moist; moderate fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and few fine and medium roots; many very fine interstitial pores; moderately acid (pH 6.0); gradual wavy boundary.

A5—23 to 34 inches; dark brown (10YR 3/3) sandy loam, very dark brown (10YR 2/2) moist; moderate fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and few fine and

medium roots; many very fine interstitial pores; slightly acid (pH 6.2); clear wavy boundary.

AC—34 to 46 inches; brown (10YR 4/3) sandy loam, dark brown (10YR 3/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots; common very fine interstitial pores; slightly acid (pH 6.2); gradual wavy boundary.

C—46 to 65 inches; dark yellowish brown (10YR 4/6) sandy loam, dark yellowish brown (10YR 3/6) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; common very fine interstitial pores; slightly acid (pH 6.2).

The depth to bedrock is more than 60 inches. The umbric epipedon is 20 to 50 inches thick and has 3 to 8 percent organic matter. The mean annual soil temperature ranges from 50 to 56 degrees F. The difference between the mean summer and mean winter soil temperatures ranges from 6 to 9 degrees F. The soil between the depths of 8 and 23 inches is moist in all parts from November 1 to June 1 and is dry in some or all parts from July 1 to October 15 in most years. The content of gravel ranges from 0 to 5 percent throughout. Base saturation ranges from 10 to 45 percent throughout.

The A horizon has color of 10YR 3/2, 3/3, 4/2, or 4/3. Moist color is 10YR 2/1, 2/2, 3/2, or 3/3. The content of clay ranges from 6 to 12 percent. Reaction ranges from strongly acid to slightly acid.

The C horizon has color of 10YR 4/4, 4/6, 5/4, or 5/6. Moist color is 10YR 3/4, 3/6, 4/4, or 4/6. The texture is sandy loam, loamy sand, or sand. The content of clay ranges from 4 to 10 percent. The content of nodules ranges from 0 to 15 percent. Some pedons are weakly cemented. Reaction is moderately acid or slightly acid.

Hiltabidel Series

The Hiltabidel series consists of well drained soils that are very shallow and shallow to bedrock. These soils formed in material weathered from ultrabasic intrusive rocks. They are on mountains. Slopes range from 5 to 75 percent. The mean annual precipitation is about 65 inches, and the mean annual air temperature is about 55 degrees F.

These soils are classified as loamy-skeletal, oxidic, nonacid, mesic Lithic Xerorthents.

Typical pedon of Hiltabidel very stony clay loam, in an area of Hiltabidel-Dann complex, 5 to 75 percent slopes; 1,600 feet south and 3,200 feet west of the northeast corner of sec. 19, T. 24 N., R 16 W., MDBM, Noble Butte quadrangle:

Oi—1/2 inch to 0; litter of knobcone pine and manzanita leaves and twigs.

A1—0 to 13 inches; reddish brown (5YR 4/4) very stony clay loam, dark reddish brown (2.5YR 3/4) moist; moderate very fine and fine granular structure; soft, very friable, slightly sticky and slightly plastic, many very fine and fine and common medium roots; many very fine and fine interstitial pores; 30 percent cobbles; 20 percent stones; neutral (pH 6.7); gradual irregular boundary.

A2—13 to 17 inches; reddish brown (5YR 4/4) extremely stony clay loam, dark reddish brown (2.5YR 3/4) moist; moderate very fine granular structure; soft, very friable, slightly sticky and slightly plastic; common fine and medium and few very fine roots; many very fine and fine interstitial pores; 20 percent cobbles; 55 percent stones; neutral (pH 6.7); abrupt irregular boundary.

R—17 inches; variegated reddish yellow (7.5YR 7/8) and gray (5Y 5/1 and 6/1), hard, fractured peridotite; many black (N 2/0) stains randomly oriented within fractures that are 1 to 2 millimeters wide and 3 to 10 centimeters apart.

The depth to hard bedrock ranges from 10 to 20 inches. The mean annual soil temperature ranges from 53 to 57 degrees F. The soil between a depth of 8 inches and bedrock is moist in all parts from November 1 through May 15 and is dry in all parts from July 1 through October 1 in most years. About 20 to 50 percent of the surface is covered with cobbles, and 10 to 40 percent is covered with stones. Base saturation ranges from 70 to 95 percent throughout. Reaction is slightly acid or neutral throughout.

The A horizon has color of 2.5YR 3/4 or 4/4 or 5YR 4/3 or 4/4. Moist color is 10R 3/4 or 2.5YR 3/4 or 4/4. The content of clay ranges from 27 to 35 percent. The content of cobbles ranges from 15 to 45 percent, and the content of stones ranges from 20 to 55 percent. The total content of coarse fragments ranges from 35 to 80 percent.

Hollowtree Series

The Hollowtree series consists of well drained soils that are moderately deep to bedrock. These soils formed in material weathered from sandstone. They are on hills and mountains. Slopes range from 9 to 75 percent. The mean annual precipitation is about 65 inches, and the mean annual air temperature is about 55 degrees F.

These soils are classified as loamy-skeletal, mixed, mesic Ultic Haploxeralfs.

Typical pedon of Hollowtree gravelly sandy loam, in an area of Holohan-Hollowtree-Casabonne complex, 30 to 50 percent slopes; 1,400 feet south and 700 feet west of the northeast corner of sec. 7, T. 21 N., R. 15 W., MDBM, Cahto Peak quadrangle:

Oi—2 inches to 0; undecomposed and partially decomposed litter of tanoak and Douglas-fir in a mulch of hard subrounded sandstone gravel; 60 percent of the surface is covered with gravel.

A—0 to 6 inches; light yellowish brown (10YR 6/4) gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; common very fine and fine and few medium roots; few very fine and fine tubular and interstitial pores; 20 percent hard subangular gravel; moderately acid (pH 6.0); clear wavy boundary.

Bt1—6 to 17 inches; very pale brown (10YR 7/4) very gravelly loam, yellowish brown (10YR 5/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and medium and few coarse roots; few very fine tubular and common very fine interstitial pores; common thin clay films on faces of peds and lining pores; 35 percent hard subrounded gravel and 5 percent hard subrounded cobbles; moderately acid (pH 6.0); clear wavy boundary.

Bt2—17 to 27 inches; very pale brown (10YR 7/4) very gravelly sandy clay loam, yellowish brown (10YR 5/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, sticky and plastic; common fine and medium and few coarse roots; few very fine tubular and many very fine interstitial pores; common thin and moderately thick clay films on faces of peds and lining pores; 30 percent hard subrounded gravel and 10 percent hard angular cobbles; moderately acid (pH 6.0); clear wavy boundary.

Bt3—27 to 38 inches; yellow (10YR 7/6) very gravelly sandy clay loam, yellowish brown (10YR 5/6) moist; moderate medium and coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common medium and few coarse roots; few very fine tubular and many very fine interstitial pores; few thin clay films on faces of peds; 30 percent hard to soft subrounded gravel and 5 percent hard subangular cobbles; moderately acid (pH 6.0); abrupt irregular boundary.

R—38 to 45 inches; hard, fractured sandstone; fractures are less than 1 millimeter wide and are 5 to 30 centimeters apart.

The depth to hard bedrock ranges from 20 to 40 inches. The mean annual soil temperature ranges from 55 to 59 degrees F. The soil between the depth of 14 inches and bedrock is moist in all parts from November 1 through June 1 and is dry in all parts from July 15 through October 1 in most years. Reaction is strongly acid or moderately acid throughout.

The A horizon has color of 10YR 5/2, 5/3, 6/2, 6/3, 6/4, 7/2, 7/3, or 7/4. Moist color is 10YR 3/2, 3/3, 4/2, 4/3, 4/4, or 5/4. The content of clay ranges from 10 to 20 percent. The content of gravel ranges from 15 to 35 percent. Base saturation ranges from 35 to 55 percent.

The Bt horizon has color of 10YR 7/3, 7/4, or 7/6. Moist color is 10YR 5/4 or 5/6. The texture is very gravelly sandy loam, very gravelly loam, or very gravelly sandy clay loam. The content of clay ranges from 15 to 27 percent. The content of gravel ranges from 25 to 60 percent. The content of cobbles ranges from 0 to 10 percent. The total content of coarse fragments ranges from 35 to 60 percent. Base saturation ranges from 40 to 60 percent.

Holohan Series

The Holohan series consists of very deep, well drained soils that formed in material weathered from sandstone. These soils are on hills and mountains. Slopes range from 9 to 75 percent. The mean annual precipitation is about 65 inches, and the mean annual air temperature is about 55 degrees F.

These soils are classified as loamy-skeletal, mixed, mesic Ultic Haploxeralfs.

Typical pedon of Holohan extremely gravelly sandy loam, in an area of Holohan-Hollowtree-Casabonne complex, 9 to 30 percent slopes; 2,000 feet north and 300 feet east of the southwest corner of sec. 2, T. 24 N., R. 17 W., MDBM, Noble Butte quadrangle:

Oi—4 inches to 0; partially decomposed and decomposed tanoak litter with 40 percent subangular gravel.

A—0 to 4 inches; light gray (10YR 7/2) extremely gravelly sandy loam, yellowish brown (10YR 5/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, nonsticky and slightly plastic; many very fine and fine and common medium roots; many very fine, fine, medium, and coarse interstitial and few very fine

tubular pores; 65 percent hard angular and subrounded gravel; strongly acid (pH 5.5); clear smooth boundary.

Bt1—4 to 12 inches; very pale brown (10YR 7/3) very gravelly loam, brown (7.5YR 5/4) moist; moderate fine and medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine and fine and few medium and coarse roots; many very fine tubular and interstitial and few medium and coarse interstitial pores; common thin clay films and silt coatings on faces of peds and lining pores; 45 percent hard angular and subrounded gravel; strongly acid (pH 5.5); clear wavy boundary.

Bt2—12 to 17 inches; very pale brown (10YR 7/3) extremely gravelly loam, yellowish brown (10YR 5/6) moist; weak fine subangular blocky and angular blocky structure; hard, very friable, slightly sticky and slightly plastic; many very fine and common fine roots; many very fine tubular and interstitial and few medium and coarse interstitial pores; common thin clay films and silt coatings on faces of peds and lining pores; 65 percent hard angular and subrounded gravel; strongly acid (pH 5.5); clear wavy boundary.

2Bt3—17 to 37 inches; very pale brown (10YR 7/3) extremely gravelly loamy sand, yellowish brown (10YR 5/6) moist; weak fine and medium granular structure; hard, very friable, nonsticky and nonplastic; many very fine, common fine and medium, and few coarse roots; many very fine, fine, medium, and coarse interstitial pores; many thin clay films and silt coatings on rock faces; 80 percent hard angular and subangular gravel (2 to 75 millimeters); 50 percent of the volume between pebbles is void space; moderately acid (pH 6.0); gradual wavy boundary.

2Bt4—37 to 74 inches; very pale brown (10YR 7/3) extremely gravelly loamy sand, brownish yellow (10YR 6/6) moist; weak fine granular and subangular blocky structure; hard, very friable, nonsticky and nonplastic; common very fine roots; many very fine, fine, medium, and coarse interstitial pores; many thin clay films and silt coatings on rock faces; 80 percent hard angular gravel; 20 percent of the volume between pebbles is void space; moderately acid (pH 6.0).

The depth to hard bedrock is more than 60 inches. The mean annual soil temperature ranges from 55 to 59 degrees F. The soil between a depth of 16 inches and bedrock is moist in all parts from November 1 through June 1 and is dry in all parts from July 15 to October 1 in most years. Reaction is strongly acid or moderately acid throughout.

The A horizon has color of 10YR 5/2, 5/3, 6/2, 6/3, 7/2, 7/3, or 7/4. Moist color is 10YR 3/2, 3/3, 4/2, 4/3, 4/4, or 5/4. The content of clay ranges from 5 to 15 percent. The content of gravel ranges from 60 to 70 percent. Base saturation ranges from 35 to 55 percent.

The Bt horizon has color of 10YR 6/2, 6/4, 7/2, 7/3, or 7/4. Moist color is 10YR 4/3, 4/4, 5/4, or 5/6 or 7.5YR 4/4 or 5/4. The texture is very gravelly or extremely gravelly loam, very gravelly or extremely gravelly sandy loam, or very gravelly or extremely gravelly sandy clay loam. The content of clay ranges from 18 to 30 percent. The content of gravel ranges from 35 to 70 percent. The content of cobbles ranges from 0 to 15 percent. Base saturation ranges from 25 to 50 percent.

The 2Bt horizon has color of 10YR 6/3 or 7/3. Moist color is 10YR 5/4, 5/6, or 6/6 or 7.5YR 4/6. The texture is very gravelly or extremely gravelly loamy sand or very gravelly or extremely gravelly sandy loam. The content of clay ranges from 5 to 15 percent. The content of gravel ranges from 45 to 80 percent. The content of cobbles ranges from 0 to 20 percent. The total content of coarse fragments ranges from 45 to 90 percent. Base saturation ranges from 35 to 70 percent.

Hopland Series

The Hopland series consists of well drained soils that are moderately deep to weathered bedrock. These soils formed in material weathered from sandstone. They are on hills and mountains. Slopes range from 30 to 75 percent. The mean annual precipitation is about 55 inches, and the mean annual air temperature is about 56 degrees F.

These soils are classified as fine-loamy, mixed, mesic Typic Haploxeralfs.

Typical pedon of Hopland loam, 50 to 75 percent slopes, 2,250 feet north and 800 feet west of the southeast corner of sec. 28, T. 14 N., R. 13 W., MDBM, Boonville Southeast quadrangle:

Oi—1 inch to 0; litter of oak leaves and twigs.

A—0 to 2 inches; yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 3/4) moist; moderate very fine and fine granular structure; hard, friable, slightly sticky and slightly plastic; common very fine and fine and few medium roots; many very fine and fine tubular and common very fine interstitial pores; slightly acid (pH 6.3); clear wavy boundary.

AB—2 to 15 inches; light yellowish brown (10YR 6/4) loam, dark brown (7.5YR 4/4) moist; moderate

fine and medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine, medium, and coarse and few very fine roots; many very fine and fine and few medium tubular and few very fine interstitial pores; moderately acid (pH 6.0); gradual wavy boundary.

Bt1—15 to 22 inches; reddish yellow (7.5YR 6/6) loam, strong brown (7.5YR 4/6) moist; moderate fine and medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine, medium, and coarse and few very fine roots; common very fine and fine and few medium tubular and common very fine interstitial pores; common thin clay films lining pores and few thin clay films bridging mineral grains; moderately acid (pH 5.6); gradual wavy boundary.

Bt2—22 to 30 inches; reddish yellow (7.5YR 6/6) loam, strong brown (7.5YR 4/6) moist; moderate fine, medium, and coarse subangular blocky structure; hard, firm, slightly sticky and plastic; few very fine and fine and common medium and coarse roots; common very fine, fine, and medium tubular and common very fine and fine interstitial pores; common moderately thick clay films lining pores and few thin clay films bridging mineral grains; moderately acid (pH 5.6); clear irregular boundary.

Cr—30 to 35 inches; reddish yellow (7.5YR 6/6), soft sandstone.

The depth to soft bedrock ranges from 20 to 40 inches. The mean annual soil temperature ranges from 54 to 59 degrees F. The soil between the depths of 7 and 20 inches is moist in all parts from November 1 to May 15 and is dry in all parts from July 1 to October 1 in most years. The content of gravel ranges from 0 to 10 percent. Base saturation ranges from 75 to 95 percent. Reaction is moderately acid or slightly acid throughout.

The A horizon has color of 10YR 5/4 or 6/4 or 7.5YR 5/6 or 6/6. Moist color is 10YR 3/4 or 4/4 or 7.5YR 4/4 or 4/6. The content of clay ranges from 15 to 25 percent.

The Bt horizon has color of 7.5YR 5/6 or 6/6. Moist color is 7.5YR 4/4, 4/6, or 5/4. The texture is loam or clay loam that contains 20 to 35 percent clay.

Hotel Series

The Hotel series consists of well drained soils that are moderately deep to bedrock. These soils formed in material weathered from sandstone. They are on hills. Slopes range from 30 to 100 percent. The mean annual precipitation is about 55 inches, and the mean annual air temperature is about 53 degrees F.

These soils are classified as loamy-skeletal, mixed, isomesic Ultic Hapludalfs.

Typical pedon of Hotel very gravelly loam, in an area of Dehaven-Hotel complex, 50 to 75 percent slopes; 200 feet north and 1,400 feet west of the southeast corner of sec. 24, T. 20 N., R. 17 W., MDBM, Dutchman’s Knoll quadrangle:

Oi—2 inches to 0; litter of redwood, Douglas-fir, and tanoak.

A—0 to 8 inches; brown (10YR 5/3) very gravelly loam, dark yellowish brown (10YR 3/4) moist; strong fine and medium subangular blocky structure; hard, very friable, nonsticky and slightly plastic; common fine and medium roots; common fine interstitial pores; 35 percent gravel; strongly acid (pH 5.5); gradual wavy boundary.

BA—8 to 17 inches; light yellowish brown (10YR 6/4) very gravelly clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; hard, very friable, slightly sticky and slightly plastic; few fine, medium, and coarse roots; common fine interstitial and tubular pores; 45 percent gravel; 5 percent cobbles; moderately acid (pH 5.8); gradual wavy boundary.

Bt—17 to 35 inches; very pale brown (10YR 7/4) very gravelly clay loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine, medium, and coarse roots; common fine interstitial and tubular pores; few thin clay films on faces of peds and bridging mineral grains; 55 percent gravel; 5 percent cobbles; strongly acid (pH 5.5); abrupt wavy boundary.

R—35 to 38 inches; hard, fractured sandstone; fractures are about 8 centimeters apart and are 10 to 25 millimeters wide.

The depth to hard bedrock ranges from 20 to 40 inches. The mean annual soil temperature ranges from 50 to 56 degrees F. The difference between the mean summer and mean winter soil temperatures ranges from 3 to 6 degrees F. The soil between the depths of 10 and 35 inches, or between a depth of 10 inches and bedrock, is moist in all parts from November 1 to August 1 and is dry in some part from September 1 to October 1 in most years.

The A horizon has color of 10YR 5/3, 6/3, or 6/4. Moist color is 10YR 3/3, 3/4, 4/2, or 4/3. The content of clay ranges from 15 to 25 percent. The content of

gravel ranges from 15 to 50 percent. The content of cobbles ranges from 0 to 5 percent. Reaction ranges from strongly acid to slightly acid.

The B horizon has color of 10YR 6/3, 6/4, 6/6, or 7/4. Moist color is 10YR 4/4, 5/3, 5/4, or 5/6. The texture is very gravelly clay loam, very gravelly sandy clay loam, or extremely gravelly clay loam. The content of clay ranges from 25 to 35 percent. The content of gravel ranges from 35 to 75 percent. The content of cobbles ranges from 0 to 10 percent. Base saturation ranges from 35 to 60 percent. Reaction is strongly acid or moderately acid.

Irmulco Series

The Irmulco series consists of well drained soils that are deep or very deep to weathered bedrock. These soils formed in material weathered from sandstone. They are on hills. Slopes range from 9 to 75 percent. The mean annual precipitation is about 55 inches, and the mean annual air temperature is about 53 degrees F.

These soils are classified as fine-loamy, mixed, isomesic Ultic Hapludalfs.

Typical pedon of Irmulco loam, in an area of Irmulco-Tramway complex, 9 to 30 percent slopes; 150 feet south and 2,720 feet east of the northwest corner of sec. 23, T. 23 N., R. 18 W., MDBM, Hales Grove quadrangle:

Oi—1 inch to 0; litter of redwood and tanoak.

A—0 to 6 inches; pale brown (10YR 6/3) loam, dark brown (10YR 3/3, 7.5YR 3/4) moist; strong very fine and fine granular structure; slightly hard, friable, nonsticky and slightly plastic; many very fine and fine roots; common fine interstitial pores; 10 percent hard subangular gravel; moderately acid (pH 5.8); clear wavy boundary.

Bt1—6 to 26 inches; light brown (7.5YR 6/4) loam, dark brown (7.5YR 4/4) moist; moderate fine and medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine and common medium roots; few fine and common very fine tubular and few very fine interstitial pores; common thin clay films on faces of peds and lining pores; 10 percent hard subangular gravel; moderately acid (pH 5.6); gradual wavy boundary.

Bt2—26 to 41 inches; light brown (7.5YR 6/4) loam, dark brown (7.5YR 4/4) moist; moderate fine and medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; common medium and coarse and few fine roots; common very fine and few fine tubular and few very fine interstitial pores; common thin clay films on faces of peds and lining pores; many thin very pale brown (10YR 7/3) coatings on faces of peds and lining pores, yellowish brown (10YR 5/4) moist; 4 percent hard subangular gravel; strongly acid (pH 5.2); gradual wavy boundary.

Bt3—41 to 56 inches; variegated light brown (7.5YR 6/4) and pink (7.5YR 7/4) clay loam, dark brown (7.5YR 4/4) moist; weak medium and coarse subangular blocky structure; hard, firm, slightly sticky and plastic; common medium and coarse and few fine roots; common very fine tubular and few very fine interstitial pores; common thin clay films on faces of peds and lining pores; 9 percent hard subangular gravel; strongly acid (pH 5.4); gradual wavy boundary.

Bt4—56 to 61 inches; variegated light brown (7.5YR 6/4), reddish yellow (7.5YR 6/6), and pink (7.5YR 7/4) clay loam, dark brown (7.5YR 4/4) and dark yellowish brown (10YR 4/4) moist; weak medium and coarse angular blocky structure; hard, firm, sticky and plastic; common medium and few fine roots; few very fine tubular and common very fine interstitial pores; many moderately thick clay films on faces of peds and common thin clay films lining pores; 2 percent hard subangular gravel; strongly acid (pH 5.4); gradual wavy boundary.

Crt—61 to 72 inches; light brown (7.5YR 6/4), highly weathered sandstone; few fine and medium roots along fracture faces; continuous moderately thick clay films on fracture faces.

The depth to soft bedrock ranges from 60 to 80 inches. The mean annual soil temperature ranges from 50 to 56 degrees F. The difference between the mean summer and mean winter soil temperatures ranges from 3 to 6 degrees F. The soil between the depths of 6 and 17 inches is moist in all parts from November 1 to August 15 and is dry in some part from September 1 to October 1 in most years.

The A horizon has color of 10YR 3/3, 4/2, 4/3, 5/3, or 6/3. Moist color is 10YR 2/2, 3/2, 3/3, 4/3, or 4/4 or 7.5YR 3/4. The content of clay ranges from 15 to 25 percent. The content of gravel ranges from 0 to 10 percent. Reaction is moderately acid or slightly acid.

The Bt horizon has color of 10YR 4/3, 4/4, 5/3, 5/4, 6/3, 6/4, or 7/4 or 7.5YR 6/4, 6/6, or 7/4. Moist color is 10YR 4/2, 4/3, 4/4, 5/3, 5/4, or 5/6 or 7.5YR 3/4, 4/4, 4/6, or 5/6. The texture is loam, clay loam, gravelly loam, or gravelly clay loam. The content of clay ranges from 20 to 40 percent. The content of gravel ranges from 0 to 25 percent. Base saturation ranges from 35 to 60 percent. Reaction ranges from very strongly acid to moderately acid.

Iversen Series

The Iversen series consists of well drained soils that are moderately deep to weathered bedrock. These soils formed in material weathered from sandstone and shale. They are on ridgetops and the upper side slopes of coastal hills and mountains. Slopes range from 2 to 30 percent. The mean annual precipitation is about 50 inches, and the mean annual air temperature is about 54 degrees F.

These soils are classified as clayey, mixed, isomesic Typic Haplustults.

Typical pedon of Iversen loam, 2 to 15 percent slopes, 1,200 feet north and 950 feet west of the southeast corner of sec. 5, T. 11 N., R. 15 W., MDBM, Gualala quadrangle:

Oi—1 inch to 0; litter of Douglas-fir and redwood.

A1—0 to 3 inches; yellowish brown (10YR 5/4) loam, dark brown (7.5YR 3/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; very fine interstitial and common very fine and fine tubular pores; 5 percent hard angular gravel (2 to 10 millimeters); slightly acid (pH 6.5); clear wavy boundary.

A2—3 to 7 inches; light brown (7.5YR 6/4) loam, strong brown (7.5YR 4/6) moist; moderate fine, medium, and coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; common very fine interstitial and tubular and few fine tubular pores; moderately acid (pH 5.8); clear wavy boundary.

Bt1—7 to 10 inches; reddish yellow (7.5YR 6/6) clay, strong brown (7.5YR 5/6) moist; strong coarse and very coarse subangular blocky structure; hard, firm, very sticky and very plastic; few very fine and fine and common medium and coarse roots; common very fine and fine tubular pores; common moderately thick and thick clay films on faces of peds and lining pores; very strongly acid (pH 5.0); clear wavy boundary.

Bt2—10 to 22 inches; reddish yellow (7.5YR 6/6) clay, strong brown (7.5YR 5/6) moist; strong medium, coarse, and very coarse angular blocky structure; very hard, very firm, sticky and very plastic; few very fine and fine and common medium and coarse roots; common very fine and fine tubular pores; many moderately thick and thick clay films on faces of peds and lining pores; 2 percent hard angular subrounded and rounded gravel; very strongly acid (pH 5.0); clear wavy boundary.

Bt3—22 to 37 inches; strong brown (7.5YR 5/6) gravelly clay, strong brown (7.5YR 4/6) moist; strong coarse angular blocky structure; hard, firm, sticky and very plastic; few fine and common medium and coarse roots; common very fine and few fine tubular pores; many moderately thick and thick clay films on faces of peds and lining pores; 20 percent slightly hard and hard angular sandstone gravel; very strongly acid (pH 5.0); abrupt irregular boundary.

Crt—37 to 46 inches; interlayered, soft to slightly hard sandstone and soft, highly weathered shale; fractures are 10 to 50 millimeters apart and are 1 to 10 millimeters wide; few fine and medium roots along fractures; clay films on fracture faces.

The depth to soft bedrock ranges from 20 to 40 inches. The mean annual soil temperature ranges from 53 to 57 degrees F. The difference between the mean summer and mean winter soil temperatures ranges from 4 to 9 degrees F. The soil between the depths of 6 and 20 inches is moist in all parts from November 1 to June 1 and is dry in all or some parts from July 1 to October 1 in most years.

The A horizon has color of 10YR 5/3 or 5/4 or 7.5YR 5/4 or 6/4. Moist color is 7.5YR 3/4, 4/4, 4/6, or 5/4. The texture is loam or sandy loam. The content of clay ranges from 18 to 27 percent. The content of gravel ranges from 0 to 10 percent. Reaction is moderately acid or slightly acid.

Some pedons have an E horizon. This horizon has color of 10YR 7/1, 7/2, or 8/1. Moist color is 10YR 6/1, 6/2, or 7/2. The content of clay ranges from 10 to 20 percent. Reaction is strongly acid or moderately acid.

The Bt horizon has color of 10YR 6/6 or 7/6 or 7.5YR 5/6 or 6/6. Moist color is 10YR 4/6, 5/6, or 6/6 or 7.5YR 4/6 or 5/6. The texture is clay loam, clay, or gravelly clay. The content of clay ranges from 27 to 60 percent. The content of gravel ranges from 0 to 20 percent. Base saturation ranges from 25 to 45 percent. Reaction is very strongly acid or strongly acid.

Kibesillah Series

The Kibesillah series consists of well drained soils that are moderately deep to bedrock. These soils formed in material weathered from sandstone. They are on hills and mountains. Slopes range from 9 to 99 percent. The mean annual precipitation is about 60 inches, and the mean annual air temperature is about 53 degrees F.

These soils are classified as loamy-skeletal, mixed, isomesic Ultic Haplustalfs.

Typical pedon of Kibesillah very gravelly loam, in an area of Yellowhound-Kibesillah-Ornbaun complex, 30 to 50 percent slopes; 2,000 feet north and 2,000 feet west of the southeast corner of sec. 13, T. 21 N., R. 17 W., MDBM, Lincoln Ridge quadrangle:

Oi—1/2 inch to 0; litter of Douglas-fir, redwood, and tanoak.

A1—0 to 4 inches; pale brown (10YR 6/3) very gravelly loam, dark brown (10YR 4/3) moist; strong very fine and fine granular structure; slightly hard, friable, nonsticky and slightly plastic; many fine and common very fine and medium roots; many very fine and fine and common medium interstitial pores; 40 percent hard subangular gravel; strongly acid (pH 5.5); clear wavy boundary.

A2—4 to 13 inches; pale brown (10YR 6/3) very gravelly loam, dark yellowish brown (10YR 4/4) moist; strong very fine and fine subangular blocky structure; slightly hard, friable, nonsticky and slightly plastic; common very fine, medium, and coarse and few fine roots; many very fine and fine and common medium interstitial pores and common very fine and medium tubular pores; 45 percent hard subangular gravel; strongly acid (pH 5.3); clear wavy boundary.

Bt1—13 to 19 inches; very pale brown (10YR 7/3) very gravelly loam, dark yellowish brown (10YR 4/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, nonsticky and slightly plastic; common medium and coarse and few very fine and fine roots; common very fine and fine and few medium interstitial pores and few fine and medium tubular pores; few thin clay films lining pores and bridging mineral grains; 50 percent hard subangular gravel; strongly acid (pH 5.3); gradual wavy boundary.

Bt2—19 to 26 inches; very pale brown (10YR 7/3) extremely gravelly clay loam, yellowish brown (10YR 5/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine, medium, and coarse roots; common very fine and few fine and medium interstitial pores and few fine tubular pores; many thin clay films on faces of peds and lining pores; 65 percent hard subangular gravel and 10 percent hard subangular cobbles; strongly acid (pH 5.3); abrupt irregular boundary.

R—26 to 28 inches; hard, fractured sandstone; fractures are 1 to 2 millimeters wide and are 5.0 to 7.5 centimeters apart; few medium and coarse roots along fractures.

The depth to hard bedrock ranges from 20 to 40 inches. The mean annual soil temperature ranges from 50 to 56 degrees F. The difference between the mean summer and mean winter soil temperatures ranges from 5 to 9 degrees F. The soil between the depths of 11 and 34 inches or between the depth of 11 inches and bedrock is moist in all parts from November 1 to June 1 and is dry in some or all parts from July 1 to October 1 in most years. Reaction is strongly acid or moderately acid throughout.

The A horizon has color of 10YR 5/2, 5/3, 6/3, or 6/4 or 7.5YR 5/4. Moist color is 10YR 4/2, 4/3, or 4/4 or 7.5YR 4/4. The content of clay ranges from 15 to 20 percent. The content of gravel ranges from 35 to 50 percent.

The Bt horizon has color of 10YR 6/3, 6/4, or 7/3. Moist color is 10YR 4/4, 5/3, or 5/4. The texture is very gravelly or extremely gravelly loam or very gravelly or extremely gravelly clay loam. The content of clay ranges from 20 to 35 percent. The content of gravel ranges from 35 to 75 percent. The content of cobbles ranges from 0 to 10 percent. Base saturation ranges from 35 to 65 percent.

Littlered Series

The Littlered series consists of very deep, well drained soils that formed in material weathered from ultrabasic intrusive rocks. These soils are on mountains. Slopes range from 2 to 30 percent. The mean annual precipitation is about 65 inches, and the mean annual air temperature is about 55 degrees F.

These soils are classified as clayey, ferritic, mesic Xeric Haplohumults.

Typical pedon of Littlered clay loam, 2 to 9 percent slopes, 1,500 feet south and 600 feet west of the northeast corner of sec. 6, T. 23 N., R. 16 W., MDBM, Leggett quadrangle:

Oi—1/2 inch to 0; litter of manzanita and pine.

A—0 to 10 inches; dark red (2.5YR 3/6) clay loam, dusky red (10R 3/4) moist; strong very fine granular structure; soft, friable, slightly sticky and slightly plastic; many very fine and fine and common medium roots; many very fine interstitial pores; 5 percent cobbles; 2 percent stones; neutral (pH 7.0); abrupt irregular boundary.

Bt—10 to 26 inches; yellowish red (5YR 5/6) clay loam, dark reddish brown (5YR 3/4) moist; weak fine granular structure; soft, friable, sticky and slightly plastic; common medium and few fine

roots; many very fine interstitial pores; few thin clay films on faces of peds and lining pores; 5 percent cobbles; 2 percent stones; slightly alkaline (pH 7.5); abrupt wavy boundary.

C—26 to 65 inches; strong brown (7.5YR 5/8) loam, strong brown (7.5YR 4/6) moist; weak fine subangular blocky structure; soft, friable, sticky and slightly plastic; few medium roots; many very fine interstitial pores; many black (N 2/0) stains on faces of peds and lining pores; 5 percent cobbles; 2 percent stones; slightly alkaline (pH 7.5).

The depth to bedrock is more than 60 inches. The content of organic carbon in the upper meter averages 0.8 to 1.0 percent. The mean annual soil temperature ranges from 53 to 57 degrees F. The soil between the depths of 6 and 16 inches is moist in all parts from November 1 to June 1 and is dry in all parts from July 15 to October 1 in most years. The content of cobbles ranges from 0 to 10 percent, and the content of stones ranges from 0 to 5 percent throughout.

The A horizon has color of 2.5YR 3/4, 3/6, or 4/4 or 5YR 4/3 or 4/4. Moist color is 2.5YR 3/4 or 4/4 or 10R 3/4 or 4/4. The content of clay ranges from 27 to 35 percent. Reaction is slightly acid or neutral.

The Bt horizon has color of 5YR 5/4 or 5/6 or 7.5YR 5/6. Moist color is 5YR 3/3 or 3/4 or 7.5YR 4/4. The texture is clay or clay loam that has 35 to 45 percent clay. Base saturation ranges from 5 to 25 percent. Reaction is neutral or slightly alkaline.

The C horizon has color of 5YR 5/8 or 7.5YR 5/6 or 5/8. Moist color is 5YR 4/6 or 7.5YR 4/4 or 4/6. The texture is loam or clay loam that has 20 to 40 percent clay. Base saturation ranges from 10 to 25 percent. Reaction is neutral or slightly alkaline.

Mackerricher Series

The Mackerricher series consists of very deep, somewhat excessively drained soils that formed in eolian sands. These soils are on stabilized sand dunes. Slopes range from 2 to 30 percent. The mean annual precipitation is about 50 inches, and the mean annual air temperature is about 53 degrees F.

These soils are classified as sandy, mixed, isomesic Typic Humitropepts.

Typical pedon of Mackerricher sandy loam, 9 to 30 percent slopes, 650 feet south and 4,150 feet east of the northwest corner of sec. 16, T. 19 N., R. 17 W., MDBM, Inglenook quadrangle:

A1—0 to 5 inches; dark brown (10YR 3/3) sandy loam, black (10YR 2/1) moist; weak very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and common fine roots; common very fine and many fine interstitial pores; neutral (pH 7.0); clear wavy boundary.

A2—5 to 12 inches; brown (10YR 4/3) sandy loam, very dark brown (10YR 2/2) moist; moderate fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; neutral (pH 7.0); clear wavy boundary.

Bw1—12 to 22 inches; brown (7.5YR 4/4) loamy sand, dark brown (7.5YR 3/4) moist; moderate very fine and fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine and coarse and common fine and medium roots; common very fine and fine interstitial and few very fine and fine tubular pores; slightly acid (pH 6.5); gradual wavy boundary.

Bw2—22 to 30 inches; strong brown (7.5YR 4/6) loamy sand, dark brown (7.5YR 3/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine and medium and few coarse roots; common very fine interstitial and few fine tubular pores; slightly acid (pH 6.3); clear wavy boundary.

C—30 to 62 inches; yellowish brown (10YR 5/6) sand, dark yellowish brown (10YR 4/6) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common medium and coarse roots; common very fine interstitial and few fine tubular pores; moderately acid (pH 6.0).

The depth to bedrock is more than 60 inches. The mollic epipedon is 10 to 20 inches thick. The content of organic carbon in the upper meter averages 0.8 to 1.0 percent. The mean annual soil temperature ranges from 50 to 56 degrees F. The difference between the mean winter and mean summer soil temperatures ranges from 3 to 6 degrees F. The soil between the depths of 9 and 36 inches is moist in all parts from November 1 to August 15 and is dry in some part from September 1 to October 1 in most years.

The A horizon has color of 10YR 3/2, 3/3, 4/2, or 4/3 or 7.5YR 3/2. Moist color is 10YR 2/1, 2/2, 3/1, or 3/2 or 7.5YR 2/2 or 3/2. The content of clay ranges from 6 to 12 percent. Base saturation ranges from 40 to 70 percent. Reaction ranges from moderately acid to neutral.

The Bw horizon has color of 7.5YR 4/4 or 4/6. Moist color is 7.5YR 3/4 or 4/4. The content of clay ranges from 4 to 12 percent. Base saturation ranges

from 25 to 50 percent. Reaction is moderately acid or slightly acid.

The C horizon has color of 10YR 4/4, 4/6, 5/4, or 5/6 or 7.5YR 4/4 or 4/6. Moist color is 10YR 4/4, 4/6, or 5/4 or 7.5YR 3/4, 4/4, or 4/6. The texture is loamy sand or sand. The content of clay ranges from 2 to 8 percent. The content of nodules ranges from 0 to 10 percent. Base saturation ranges from 20 to 40 percent. Reaction is moderately acid or slightly acid.

Mallopass Series

The Mallopass series consists of very deep, moderately well drained soils that formed in alluvium derived from mixed rock sources. These soils are on marine terraces and coastal fan terraces. Slopes range from 0 to 30 percent. The mean annual precipitation is about 40 inches, and the mean annual air temperature is about 53 degrees F.

These soils are classified as fine-loamy, mixed, isomesic Pachic Argiustolls.

Typical pedon of Mallopass loam, 0 to 5 percent slopes, 1,775 feet south and 1,850 feet west of the northeast corner of sec. 24, T. 14 N., R. 17 W., MDBM, Mallo Pass Creek quadrangle:

A1—0 to 3 inches; very dark grayish brown (10YR 3/2) loam, black (10YR 2/1) moist; moderate medium and coarse granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine tubular and interstitial pores; 5 percent hard angular sandstone gravel; moderately acid (pH 5.8); clear wavy boundary.

A2—3 to 14 inches; very dark grayish brown (10YR 3/2) loam, black (10YR 2/1) moist; strong medium, coarse, and very coarse granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular and interstitial pores; 5 percent hard angular sandstone gravel; moderately acid (pH 5.8); clear wavy boundary.

AB—14 to 23 inches; very dark gray (10YR 3/1) clay loam, black (10YR 2/1) moist; strong fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; many very fine tubular and interstitial pores; 5 percent hard angular sandstone gravel; slightly acid (pH 6.5); gradual wavy boundary.

Bt1—23 to 34 inches; very dark grayish brown (10YR 3/2) clay loam, black (10YR 2/1) moist; strong fine and medium subangular blocky structure; slightly hard, friable, sticky and plastic; few very fine roots; many very fine tubular and interstitial pores; few thin and moderately thick clay films lining pores; 10 percent hard angular sandstone gravel; neutral (pH 6.8); gradual wavy boundary.

Bt2—34 to 51 inches; light brownish gray (10YR 6/2) gravelly sandy clay loam, dark brown (10YR 3/3) moist; moderate fine and medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine tubular and interstitial pores; few thin clay films on faces of peds and lining pores; 30 percent hard angular sandstone gravel; neutral (pH 7.0); gradual wavy boundary.

Bt3—51 to 62 inches; light brownish gray (10YR 6/2) gravelly sandy clay loam, dark yellowish brown (10YR 4/4) moist; common fine and medium prominent strong brown (7.5YR 5/6) mottles, strong brown (7.5YR 5/8) moist; moderate fine and medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine tubular and interstitial pores; few thin clay films on faces of peds and lining pores; 25 percent hard subangular, subrounded, and rounded sandstone gravel; neutral (pH 7.0).

The depth to bedrock is more than 60 inches. The mollic epipedon is 20 to 50 inches thick and has 1 to 7 percent organic matter. The mean annual soil temperature ranges from 50 to 56 degrees F. The difference between the mean summer and mean winter soil temperatures ranges from 6 to 9 degrees F. The soil between the depths of 6 and 17 inches is moist in all parts from November 1 to June 1 and is dry in some or all parts from July 1 to October 1 in most years. The soil is saturated with water for brief periods following episodes of heavy rain from December through April. The saturated zone starts below a depth of 48 inches and extends to a depth of more than 60 inches. The soil is not saturated above a depth of 60 inches from summer through early fall.

The A horizon has color of 10YR 3/1, 3/2, 3/3, 4/1, or 4/2. Moist color is 10YR 2/1, 2/2, 3/1, or 3/3. The content of clay ranges from 20 to 27 percent. The content of hard angular gravel ranges from 2 to 15 percent. Base saturation ranges from 65 to 100 percent. Reaction is moderately acid or slightly acid.

The B horizon has color of 10YR 3/1, 3/2, 4/2, 4/3, 5/2, 5/3, 5/4, 6/2, 6/3, 7/2, or 7/3. Moist color is 10YR 2/1, 3/1, 3/2, 3/3, 4/2, 4/3, 4/4, or 4/6. Mottles are below a depth of 50 inches. They have dry color of 7.5YR 5/6 or 5/8 or 10YR 5/6 or 5/8 and moist color of 7.5YR 4/6, 5/6, or 5/8 or 10YR 5/4, 5/6, 5/8, 6/6, or 6/8. The upper part of the B horizon is loam, clay loam, or sandy clay loam. The lower part is gravelly

loam, gravelly clay loam, or gravelly sandy clay loam. The content of clay ranges from 25 to 35 percent. The content of hard gravel ranges from 2 to 35 percent. Base saturation ranges from 75 to 100 percent. Reaction is slightly acid or neutral.

Maymen Series

The Maymen series consists of somewhat excessively drained soils that are shallow to bedrock. These soils formed in material weathered from sandstone or shale. They are on mountains. Slopes range from 30 to 75 percent. The mean annual precipitation is 55 inches, and the mean annual air temperature is 55 degrees F.

These soils are classified as loamy, mixed, mesic Dystric Lithic Xerochrepts.

Typical pedon of Maymen loam, in an area of Maymen-Woodin-Etsel complex, 30 to 75 percent slopes; 1,200 feet north and 1,900 feet east of the southwest corner of sec. 21, T. 14 N., R. 13 W., MDBM, Boonville Southeast quadrangle:

Oi—1 inch to 0; slightly decomposed litter of oak and manzanita.

A—0 to 8 inches; brown (7.5YR 4/4) loam, dark brown (7.5YR 3/2) moist; strong fine and medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine, common fine, and few medium and coarse roots; many very fine and fine interstitial pores; 10 percent gravel; strongly acid (pH 5.5); clear wavy boundary.

Bw—8 to 14 inches; light brown (7.5YR 6/4) loam, strong brown (7.5YR 4/6) moist; moderate fine granular structure; slightly hard, friable, slightly sticky and nonplastic; few very fine and fine and common medium and coarse roots; many very fine and fine interstitial pores; 10 percent gravel; 2 percent cobbles; strongly acid (pH 5.2); abrupt irregular boundary.

R—14 inches; reddish yellow (7.5YR 6/6), hard fractured sandstone; few fractures 2 to 5 millimeters apart; roots along fractures.

The depth to hard bedrock ranges from 10 to 20 inches. The mean annual soil temperature ranges from 54 to 59 degrees F. The soil between a depth of 7 inches and bedrock is moist in all parts from November 1 to May 1 and is dry in all parts from June 15 to October 1 in most years. Reaction is strongly acid or moderately acid.

The A horizon has color of 10YR 5/3 or 6/3 or 7.5YR 4/4 or 5/4. Moist color is 10YR 3/2 or 3/3 or 7.5YR 3/2. The content of clay ranges from 10 to 25 percent. The content of gravel ranges from 10 to 15 percent. Base saturation ranges from 60 to 90 percent.

The B horizon has color of 10YR 5/4, 5/6, or 6/6 or 7.5YR 5/6, 5/8, 6/4, or 6/6. Moist color is 10YR 3/3 or 4/3 or 7.5YR 4/4 or 4/6. The texture is loam or gravelly loam. The content of clay ranges from 10 to 25 percent. The content of gravel also ranges from 10 to 25 percent. Base saturation ranges from 30 to 60 percent.

Ornbaun Series

The Ornbaun series consists of well drained soils that are deep to weathered bedrock. These soils formed in material weathered from sandstone or mudstone. They are on hills and mountains. Slopes range from 9 to 75 percent. The mean annual precipitation is about 60 inches, and the mean annual air temperature is about 53 degrees F.

These soils are classified as fine-loamy, mixed, isomesic Ultic Haplustalfs.

Typical pedon of Ornbaun loam, in an area of Ornbaun-Zeni complex, 30 to 50 percent slopes; 1,900 feet south and 1,800 feet east of the northwest corner of sec. 14, T. 13 N., R. 14 W., MDBM, Ornbaun Valley Northeast quadrangle:

Oi—1/2 inch to 0; litter of redwood and Douglas-fir.

A—0 to 3 inches; light yellowish brown (10YR 6/4) loam, dark yellowish brown (10YR 3/4) moist; weak fine subangular blocky and weak medium granular structure; hard, friable, slightly sticky and slightly plastic; common fine and few very fine and coarse roots; few very fine and fine interstitial and few fine tubular pores; 5 percent soft subangular gravel; moderately acid (pH 5.6); clear wavy boundary.

BAt—3 to 9 inches; light brown (7.5YR 6/4) loam, dark yellowish brown (7.5YR 4/4) moist; weak fine angular blocky structure; hard, firm, sticky and plastic; common fine and few very fine, medium, and coarse roots; few very fine interstitial and common fine tubular and interstitial pores; few thin clay films bridging mineral grains; 2 percent soft subangular gravel; strongly acid (pH 5.5); clear wavy boundary.

Bt1—9 to 25 inches; variegated reddish yellow (7.5YR 7/6) and light brown (7.5YR 6/4) loam, strong brown (7.5YR 5/6) moist; moderate fine and medium angular blocky structure; hard, firm, sticky and plastic; common fine and few very fine, medium, and coarse roots; few very fine interstitial and common fine tubular and

interstitial pores; common moderately thick clay films on faces of peds and lining pores; moderately acid (pH 5.6); gradual wavy boundary.

Bt2—25 to 40 inches; variegated light brown (7.5YR 6/4) and yellowish red (5YR 5/6) gravelly loam, strong brown (7.5YR 5/6) moist; weak fine and medium angular blocky structure; hard, firm, sticky and plastic; common fine and few very fine, coarse, and very coarse roots; few very fine and fine interstitial pores; common moderately thick clay films on faces of peds and lining pores; 16 percent soft subangular gravel; deposits of clay in old root channels; strongly acid (pH 5.5); gradual wavy boundary.

Bt3—40 to 50 inches; variegated reddish yellow (5YR 6/6) and pink (7.5YR 7/4) clay loam, yellowish red (5YR 4/6) and strong brown (7.5YR 5/6) moist; weak fine angular blocky structure; very hard, very firm, sticky and very plastic; few fine, medium, and coarse roots; few very fine tubular pores; many moderately thick clay films on faces of peds; 14 percent soft subangular gravel; strongly acid (pH 5.4); clear irregular boundary.

Bt4—50 to 59 inches; variegated reddish yellow (5YR 5/6) and pink (7.5YR 7/4) clay loam, yellowish red and strong brown (7.5YR 5/6) moist; weak fine angular blocky structure; very hard, very firm, sticky and very plastic; few fine, medium, and coarse roots; few very fine tubular pores; many moderately thick clay films on faces of peds; 10 percent soft subangular gravel; strongly acid (pH 5.2); abrupt irregular boundary.

Cr—59 to 61 inches; soft, fractured sandstone; fractures are about 1 to 3 millimeters wide and about 10 centimeters apart.

The depth to bedrock ranges from 40 to 60 inches. The mean annual soil temperature ranges from 50 to 56 degrees F. The difference between the mean summer and mean winter soil temperatures ranges from 5 to 9 degrees F. The soil between depths of 6 and 17 inches is moist in all parts from November 1 to June 1 and is dry in some or all parts from July 1 to October 1 in most years. Base saturation ranges from 40 to 75 percent throughout.

The A horizon has color of 10YR 5/2, 6/2, 6/3, or 6/4. Moist color is 10YR 2/2, 3/3, 3/4, 4/3, or 4/4. The content of clay ranges from 15 to 25 percent. The content of soft gravel ranges from 0 to 10 percent. Reaction ranges from strongly acid to slightly acid.

The Bt horizon has color of 7.5YR 6/4, 6/6, 7/4, or 7/6 or 5YR 5/6 or 6/6. Moist color is 7.5YR 4/4, 5/6, 6/4, 6/6, or 7/6 or 5YR 4/6 or 5/6. The texture is loam or clay loam. The content of clay ranges from 20 to 40 percent. The content of soft gravel ranges from 0 to 30 percent. Reaction ranges from very strongly acid to moderately acid.

Pardaloe Series

The Pardaloe series consists of well drained soils that are deep to bedrock. These soils formed in material weathered from sandstone. They are on hills and mountains. Slopes range from 30 to 75 percent. The mean annual precipitation is about 60 inches, and the mean annual air temperature is about 55 degrees F.

These soils are classified as loamy-skeletal, mixed, mesic Typic Xerochrepts.

Typical pedon of Pardaloe very gravelly loam, in an area of Pardaloe-Woodin complex, 50 to 75 percent slopes; 1,800 feet south and 800 feet west of the northeast corner of sec. 8, T. 13 N., R. 14 W., MDBM, Ornbaun Valley Southwest quadrangle:

A—0 to 11 inches; pink (7.5YR 7/4) very gravelly loam, brown (7.5YR 5/4) moist; moderate medium subangular blocky and strong fine granular structure; hard, friable, slightly sticky and slightly plastic; few very fine, fine, medium, and coarse roots; many very fine and fine tubular and interstitial pores; 35 percent gravel (2 to 40 millimeters); slightly acid (pH 6.4); clear wavy boundary.

BA—11 to 26 inches; very pale brown (10YR 7/4) extremely gravelly sandy loam, strong brown (7.5YR 5/6) moist; weak medium subangular blocky structure parting to moderate fine granular; slightly hard, friable, slightly sticky and slightly plastic; few very fine, fine, medium, and coarse roots; many very fine and fine tubular and interstitial and common medium and coarse interstitial pores; 70 percent gravel; slightly acid (pH 6.4); gradual wavy boundary.

Bt1—26 to 39 inches; reddish yellow (7.5YR 7/6) extremely gravelly sandy clay loam, strong brown (7.5YR 5/6) moist; weak medium subangular blocky structure parting to weak very fine and fine granular; slightly hard, friable, slightly sticky and slightly plastic; few very fine, fine, and medium roots; many very fine and fine tubular and interstitial pores; many thin clay films on faces of peds and lining pores; 60 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.

Bt2—39 to 54 inches; brownish yellow (10YR 6/6) extremely gravelly sandy clay loam, yellowish brown (10YR 5/6) moist; weak fine and medium subangular blocky structure; slightly hard, friable,

slightly sticky and slightly plastic; few very fine, fine, and coarse roots; common very fine and fine tubular and interstitial and common medium interstitial pores; common moderately thick clay films on faces of peds and lining pores; 65 percent gravel; slightly acid (pH 6.3); abrupt wavy boundary.

R—54 to 69 inches; hard, fractured sandstone; fractures are 1 to 18 centimeters apart and less than 1 millimeter wide; few very fine, fine, and coarse roots along fractures; continuous moderately thick clay films on rock faces.

The depth to hard bedrock ranges from 40 to 60 inches. The mean annual soil temperature ranges from 54 to 59 degrees F. The soil between the depths of 10 and 30 inches is moist in all parts from November 1 to May 15 and is dry in all parts from July 1 to October 1 in most years. Base saturation ranges from 70 to 90 percent throughout. Reaction is moderately acid or slightly acid.

The A horizon has color of 7.5YR 7/4, 6/4, or 6/2. Moist color is 7.5YR 5/4, 4/4, or 4/2. The content of clay ranges from 15 to 25 percent. The content of gravel ranges from 35 to 50 percent.

The Bt horizon has color of 10YR 7/4, 6/6, or 6/4 or 7.5YR 7/6, 6/6, or 6/4. Moist color is 10YR 5/6, 5/4, or 4/4 or 7.5YR 5/6, 5/4, or 4/4. The texture is very gravelly or extremely gravelly sandy loam, very gravelly loam, or very gravelly or extremely gravelly sandy clay loam. The content of clay ranges from 15 to 27 percent. The content of gravel ranges from 35 to 85 percent.

Perrygulch Series

The Perrygulch series consists of very deep, very poorly drained soils that formed in alluvium derived from mixed rock sources. These soils are on river terraces. Slopes range from 0 to 9 percent. The mean annual precipitation is about 45 inches, and the mean annual air temperature is about 56 degrees F.

These soils are classified as fine, mixed, thermic Typic Endoaqualfs.

Typical pedon of Perrygulch loam, 0 to 9 percent slopes, 1,400 feet south and 2,450 feet east of the northwest corner of sec. 11, T. 14 N., R. 15 W., MDBM, Boonville Southwest quadrangle:

A—0 to 3 inches; light brownish gray (2.5Y 6/2) loam, brown (10YR 4/3) moist; moderate fine and medium granular structure; soft, friable, slightly sticky and slightly plastic; many very fine roots; many very fine and fine interstitial pores; 5 percent hard angular gravel (2 to 30 millimeters); strongly acid (pH 5.4); clear wavy boundary.

Ag—3 to 7 inches; light gray (2.5Y 7/2) loam, grayish brown (2.5Y 5/2) moist; common fine distinct strong brown (7.5YR 5/6) mottles, brown (7.5YR 4/4) moist; moderate medium and coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine tubular and interstitial and few fine tubular pores; 5 percent hard angular gravel; very strongly acid (pH 4.9); abrupt smooth boundary.

Btg1—7 to 16 inches; light gray (10YR 7/2) sandy clay loam, light brownish gray (10YR 6/2) moist; many fine distinct reddish yellow (7.5YR 6/6) mottles, strong brown (7.5YR 5/6) moist; moderate fine, medium, and coarse subangular blocky structure; hard, firm, sticky and slightly plastic; few very fine roots; common very fine tubular and interstitial and common fine tubular pores; few thin clay films on faces of peds and lining pores; 5 percent hard angular gravel; very strongly acid (pH 4.7); abrupt smooth boundary.

Btg2—16 to 36 inches; light gray (2.5Y 7/2) clay, light brownish gray (2.5Y 6/2) moist; many fine and medium distinct very pale brown (10YR 7/4) mottles, yellowish brown (10YR 5/6) moist; strong coarse and very coarse angular blocky structure; very hard, very firm, very sticky and plastic; few very fine roots; few very fine tubular and interstitial pores; many moderately thick and thick clay films on faces of peds and lining pores; 5 percent hard angular gravel (2 to 40 millimeters); very strongly acid (pH 5.0); gradual wavy boundary.

Bt1—36 to 44 inches; light gray (2.5Y 7/2) sandy clay, light yellowish brown (2.5Y 6/4) moist; many medium and coarse distinct strong brown (7.5YR 5/6) mottles, strong brown (7.5YR 4/6) moist; weak medium and coarse subangular blocky structure; hard, firm, sticky and plastic; few very fine roots; few very fine tubular and interstitial pores; many thin clay films on faces of peds and lining pores; 5 percent hard angular gravel; very strongly acid (pH 4.8); clear wavy boundary.

Bt2—44 to 52 inches; variegated light gray (2.5Y 7/2) and pale yellow (2.5Y 7/4) sandy clay loam, light yellowish brown (2.5Y 6/4) moist; common fine distinct strong brown (7.5YR 5/6) mottles, strong brown (7.5YR 5/6) moist; weak fine and medium subangular blocky structure; hard, firm, sticky and plastic; few very fine roots; few very fine interstitial and common very fine tubular pores; common moderately thick clay films on faces of

peds and lining pores; 5 percent hard angular gravel; strongly acid (pH 5.4); clear wavy boundary.

2Bt3—52 to 61 inches; variegated pale yellow (2.5Y 7/4) and light yellowish brown (2.5Y 6/4) gravelly sandy clay loam, light yellowish brown (2.5Y 6/4) and light olive brown (2.5Y 5/4) moist; massive; slightly hard, friable, sticky and slightly plastic; few very fine roots; common very fine tubular and interstitial pores; few moderately thick clay films on fracture faces, lining pores, and bridging sand grains; 30 percent hard rounded subangular and angular gravel; 50 percent of the horizon is very soft, highly weathered sandstone fragments; slightly acid (pH 6.2).

The depth to bedrock is more than 60 inches. The mean annual soil temperature ranges from 59 to 62 degrees F. The soil between the depths of 6 and 18 inches is moist in all parts from November 1 to June 15 and is dry in all parts from August 1 to October 1 in most years. The soil is saturated with water for long or very long periods following episodes of heavy rain from December through April. The saturated zone starts between the surface and a depth of 12 inches and extends to a depth of 60 inches or more. The soil is not saturated above a depth of 60 inches from summer through early fall.

The A horizon has color of 2.5Y 5/2 or 6/2 or 10YR 5/2, 5/3, 6/2, 6/3, or 7/2. Moist color is 2.5Y 4/2 or 5/2 or 10YR 3/2, 3/3, 4/2, or 4/3. The content of clay ranges from 15 to 27 percent. The content of gravel ranges from 2 to 10 percent. Reaction ranges from very strongly acid to moderately acid.

The Bt horizon has color of 2.5Y 5/4, 6/4, 7/2, or 7/4 or 10YR 5/2, 6/2, 7/2, 6/3, or 7/3. Moist color is 2.5Y 5/4, 6/2, or 6/4 or 10YR 4/2, 5/3, 5/4, or 6/3. Mottles have dry color of 10YR 5/8, 6/1, 7/1, or 7/4 or 7.5YR 5/6, 5/8, or 6/6 and moist color of 10YR 5/1, 5/6, 5/8, 6/1, or 6/8 or 7.5YR 4/6, 5/6, or 5/8. Matrix or mottle colors with moist chroma of 1 or 2 begin above a depth of 12 inches and extend to a depth of more than 60 inches in some pedons. The Bt horizon is sandy clay loam, clay loam, sandy clay, or clay and is gravelly or very gravelly sandy clay loam below a depth of 50 inches in most pedons. The content of clay ranges from 25 to 50 percent. The content of gravel ranges mainly from 2 to 10 percent but ranges from 25 to 50 percent in the lower part of the horizon. Base saturation ranges from 40 to 90 percent. Reaction ranges from very strongly acid to slightly acid.

Pinole Series

The Pinole series consists of very deep, well drained soils that formed in alluvium derived from mixed rock sources. These soils are on river terraces. Slopes range from 2 to 15 percent. The mean annual precipitation is about 45 inches, and the mean annual air temperature is about 56 degrees F.

These soils are classified as fine-loamy, mixed, thermic Ultic Argixerolls.

Typical pedon of Pinole loam, 2 to 9 percent slopes, 2,250 feet south and 2,200 feet east of the northwest corner of sec. 11, T. 14 N., R. 15 W., MDBM, Boonville Southwest quadrangle:

A1—0 to 5 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; strong fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; common very fine tubular and interstitial pores; 2 percent hard rounded, subrounded, and subangular gravel; moderately acid (pH 5.8); abrupt wavy boundary.

A2—5 to 10 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine tubular and few very fine interstitial pores; 2 percent hard rounded, subrounded, and subangular gravel; slightly acid (pH 6.2); clear wavy boundary.

Bt1—10 to 19 inches; yellowish brown (10YR 5/4) clay loam, brown (7.5YR 4/4) moist; strong medium and coarse subangular blocky structure; hard, firm, sticky and plastic; common very fine roots; many very fine tubular and few fine interstitial pores; common thin clay films on faces of peds and lining pores; 2 percent hard rounded, subrounded, and subangular gravel; slightly acid (pH 6.3); gradual wavy boundary.

Bt2—19 to 26 inches; strong brown (7.5YR 5/6) clay loam, brown (7.5YR 4/4) moist; strong medium and coarse subangular blocky structure; hard, firm, sticky and plastic; few very fine roots; many very fine tubular and few fine interstitial pores; many moderately thick clay films on faces of peds and lining pores; 2 percent hard rounded, subrounded, and subangular gravel; slightly acid (pH 6.5); gradual wavy boundary.

Bt3—26 to 52 inches; strong brown (7.5YR 5/6) clay loam, brown (7.5YR 4/4) moist; strong medium and coarse subangular blocky structure; very

hard, very firm, sticky and plastic; many very fine tubular and few fine interstitial pores; continuous moderately thick and thick clay films on faces of peds and lining pores; 2 percent hard rounded, subrounded, and subangular gravel; slightly acid (pH 6.5); gradual wavy boundary.

Bt4—52 to 62 inches; variegated brownish yellow (10YR 6/6) and strong brown (7.5YR 5/6) clay loam, yellowish brown (10YR 5/6) and brown (7.5YR 4/4) moist; common fine and medium subangular blocky structure; hard, firm, sticky and plastic; few very fine roots; common very fine tubular pores; common moderately thick clay films on faces of peds and lining pores; 2 percent hard rounded, subrounded, and subangular gravel; strongly acid (pH 5.5).

The depth to bedrock is more than 60 inches. The mean annual soil temperature ranges from 59 to 62 degrees F. The mollic epipedon is 10 to 20 inches thick and has 1 to 5 percent organic matter. The soil between the depths of 6 and 17 inches is moist in all parts from November 1 to May 1 and is dry in all parts from June 1 to October 1 in most years. Reaction is moderately acid or slightly acid throughout.

The A horizon has color of 10YR 5/2 or 5/3. Moist color is 10YR 3/2 or 3/3. The content of clay ranges from 15 to 27 percent. The content of gravel ranges from 2 to 10 percent. Base saturation ranges from 50 to 75 percent.

The Bt horizon has color of 10YR 5/4, 6/4, or 6/6 or 7.5YR 4/6 or 5/6. Moist color is 10YR 4/4 or 5/6 or 7.5YR 3/4, 4/4, or 4/6. The texture is sandy clay loam or clay loam. The content of clay ranges from 25 to 35 percent. The content of gravel ranges from 2 to 15 percent. Base saturation ranges from 60 to 90 percent.

Quinliven Series

The Quinliven series consists of very deep, moderately well drained soils that formed in marine sediments. These soils are on marine terraces. Slopes range from 2 to 50 percent. The mean annual precipitation is about 50 inches, and the mean annual air temperature is about 53 degrees F.

These soils are classified as clayey, mixed, isomesic Typic Haplohumults.

Typical pedon of Quinliven sandy loam, in an area of Quinliven-Ferncreek complex, 2 to 15 percent slopes; 2,000 feet north and 1,150 feet west of the southeast corner of sec. 20, T. 18 N., R. 17 W., MDBM, Fort Bragg quadrangle:

Oi—5 inches to 0; decomposing litter of redwood, Douglas-fir, and bishop pine.

E—0 to 4 inches; light gray (10YR 7/1) sandy loam, gray (10YR 5/1) moist; massive; slightly hard, friable, slightly sticky and nonplastic; slightly brittle when moist; slightly smeary; common very fine, many fine, and few medium and coarse roots; many very fine interstitial and few very fine tubular pores; very strongly acid (pH 4.5); clear wavy boundary.

EB—4 to 11 inches; variegated white (10YR 8/1) and very pale brown (10YR 7/3) loam, light brownish gray (10YR 6/2) and yellowish brown (10YR 5/4) moist; massive; slightly hard, friable, sticky and slightly plastic; slightly brittle when moist; slightly smeary; few very fine, medium, and coarse and common fine roots; common very fine and fine tubular and few very fine and fine interstitial pores; extremely acid (pH 4.2); gradual wavy boundary.

Bt1—11 to 18 inches; light yellowish brown (10YR 6/4) loam, yellowish brown (10YR 5/6) moist; moderate very fine, fine, and medium subangular blocky structure; slightly hard, firm, sticky and plastic; few very fine and fine roots; common very fine and fine tubular and fine interstitial pores; few thin and moderately thick clay films on faces of peds and lining pores; very strongly acid (pH 5.0); gradual wavy boundary.

Bt2—18 to 32 inches; brownish yellow (10YR 6/6) clay, dark yellowish brown (10YR 4/6) moist; moderate very fine, fine, and medium subangular blocky structure; hard, firm, sticky and plastic; few very fine, fine, medium, and coarse roots; common very fine and fine tubular pores; common moderately thick clay films on faces of peds and lining pores; very strongly acid (pH 5.0); gradual wavy boundary.

Bt3—32 to 51 inches; brownish yellow (10YR 6/6) clay, yellowish brown (10YR 5/6) moist; many fine, medium, and coarse prominent red (2.5YR 4/8) mottles, red (2.5YR 4/6) moist; weak fine angular blocky structure; slightly hard, firm, sticky and plastic; few very fine and fine roots; common very fine and fine tubular pores; few thin and moderately thick clay films on faces of peds and lining pores; very strongly acid (pH 4.5); gradual wavy boundary.

Bt4—51 to 60 inches; yellowish red (5YR 5/6) clay loam, red (2.5YR 4/8) moist; many fine and medium distinct strong brown (7.5YR 5/6) mottles, strong brown (7.5YR 4/6) moist; many fine prominent light gray (2.5Y 7/2) mottles, light brownish gray (2.5Y 6/2) moist; weak fine angular

blocky structure; slightly hard, firm, slightly sticky and slightly plastic; few very fine and fine roots; common very fine and fine tubular pores; few moderately thick clay films on faces of peds and lining pores; very strongly acid (pH 4.5); clear wavy boundary.

C—60 to 64 inches; yellowish red (5YR 5/8) sandy loam, red (2.5YR 4/8) moist; common fine and medium distinct strong brown (7.5YR 5/6) mottles, strong brown (7.5YR 5/6) moist; massive; slightly hard, friable, slightly sticky and nonplastic; few very fine and fine roots; common very fine and few fine tubular pores; extremely acid (pH 4.2).

The depth to bedrock ranges from 60 to more than 80 inches. The content of organic carbon in the upper meter averages 0.8 to 1.0 percent. The mean annual soil temperature ranges from 50 to 56 degrees F. The difference between the mean summer and mean winter soil temperatures ranges from 3 to 6 degrees F. The soil between the depths of 7 and 17 inches is moist in all parts from November 1 to August 15 and is dry in some part from September 1 to October 1 in most years. The soil is saturated with water between the depths of 48 and 72 inches for brief periods following episodes of heavy rain from December through April. The soil is not saturated above a depth of 60 inches from summer through early fall.

The E horizon has color of 2.5Y 7/2; 10YR 6/1, 6/2, 7/1, 7/2, 7/3, or 8/1; 5YR 7/1 or 8/1; or N 8/0. Moist color is 10YR 4/2, 5/1, 5/2, 6/1, 6/2, 6/3, or 7/2 or 5YR 6/1 or 7/1. The content of clay ranges from 5 to 15 percent. Smeariness and brittleness are slight or moderate under moist conditions. Reaction ranges from very strongly acid to moderately acid.

The EB horizon has color of 10YR 6/4, 6/6, 7/1, 7/2, 7/3, or 8/1 or 7.5YR 5/6. Moist color is 10YR 5/2, 5/4, 5/6, 6/2, or 6/3 or 7.5YR 4/6. The texture is sandy loam or loam that contains 10 to 20 percent clay. Smeariness is slight or moderate, and brittleness is slight to strong. Reaction ranges from extremely acid to strongly acid.

The Bt horizon has color of 10YR 5/4, 5/6, 5/8, 6/4, 6/6, 6/8, or 7/6; 7.5YR 5/6, 6/4, 6/6, or 6/8; or 5YR 5/6. Moist color is 10YR 4/4, 4/6, 5/4, 5/6, 5/8, 6/6, or 6/8; 7.5YR 4/4, 4/6, 5/4, 5/6, 5/8, or 6/8; 5YR 4/6, 4/8, or 5/6; or 2.5YR 4/8. Mottles have dry color of 2.5Y 7/2, 10YR 6/8, 7.5YR 4/8 or 5/6, 5YR 5/6, or 2.5YR 4/8 and moist color of 2.5Y 6/2; 10YR 5/6 or 5/8; 7.5YR 4/6, 5/6, or 5/8; 5YR 4/6; or 2.5YR 4/6 or 5/8. Mottles with chroma of 2, if they occur, are below a depth of 50 inches. The Bt horizon is loam, sandy clay loam, clay loam, sandy clay, or clay that has a clay content of 20 to 60 percent. Base saturation ranges from 5 to 35 percent. Reaction ranges from extremely acid to strongly acid.

The C horizon has color of 2.5Y 8/4; 10YR 6/4, 7/4, or 8/4; 7.5YR 6/4 or 6/8; or 5YR 5/8, 6/8, or 7/6. Moist color is 2.5Y 7/4; 10YR 5/4, 6/4, or 7/6; 7.5YR 5/4, 5/6, or 5/8; 5YR 5/8 or 6/8; or 2.5YR 4/8. Mottles have dry color of 2.5Y 8/4, 10YR 7/6, 7.5YR 5/6 or 6/6, or 5YR 6/8 and moist color of 2.5Y 7/4, 10YR 6/8, 7.5YR 5/6, or 5YR 5/8. The C horizon is sandy loam or loamy sand that has a clay content of 5 to 20 percent. Base saturation ranges from 5 to 30 percent. Reaction ranges from extremely acid to strongly acid.

Seaside Series

The Seaside series consists of somewhat excessively drained soils that are very shallow to bedrock. These soils formed in material weathered from sandstone. They are on coastal hills and mountains. Slopes range from 5 to 30 percent. The mean annual precipitation is about 50 inches, and the mean annual air temperature is about 55 degrees F.

These soils are classified as loamy, mixed, acid, thermic Lithic Xerorthents.

Typical pedon of Seaside loamy sand, in an area of Seaside-Rock outcrop complex, 5 to 30 percent slopes; 750 feet south and 1,380 feet east of the northwest corner of sec. 7, T. 11 N., R. 15 W., MDBM, Gualala quadrangle:

Oi—1/2 inch to 0; litter of manzanita leaves and twigs over an organic mat of lichens and moss.

A—0 to 1 inch; very pale brown (10YR 7/3) loamy sand, yellowish brown (10YR 5/4) moist; weak fine and medium subangular blocky structure; loose, nonsticky and nonplastic; common very fine and fine roots; many very fine and fine interstitial pores; 5 percent hard subrounded sandstone gravel and 5 percent hard subrounded sandstone cobbles; extremely acid (pH 4.4); abrupt smooth boundary.

Bw—1 to 7 inches; pale brown (10YR 6/3) sandy loam, yellowish brown (10YR 5/4) moist; weak very fine and fine subangular blocky structure; loose, very friable, nonsticky and nonplastic; many very fine and fine and common medium and coarse roots; few very fine tubular and many very fine and fine interstitial pores; very strongly acid (pH 4.9); abrupt irregular boundary.

R—7 inches; hard, fractured, coarse grained sandstone; fracture pattern is highly variable with few very fine, fine, and medium roots along fractures.

The depth to hard bedrock ranges from 5 to 10

inches. The mean annual soil temperature ranges from 59 to 61 degrees F. The soil is moist in all parts from November 1 to May 1 and is dry in all parts from June 1 to October 15 in most years. The content of coarse fragments ranges from 0 to 15 percent. Reaction is extremely acid or very strongly acid.

The A horizon has color of 2.5Y 6/2 or 7/2 or 10YR 7/3. Moist color is 5Y 8/1, 2.5Y 4/2 or 5/2, or 10YR 5/2, 5/3, 5/4, 6/3, or 7/2. The content of clay ranges from 4 to 10 percent.

The B horizon has color of 10YR 5/4, 6/3, 6/4, 7/3, 7/4, or 7/6. Moist color is 10YR 4/4, 5/3, 5/4, 5/6, 6/3, 6/4, 6/6, or 7/2. The content of clay ranges from 7 to 12 percent.

Shinglemill Series

The Shinglemill series consists of very deep, poorly drained soils that formed in marine sediments. These soils are on marine terraces. Slopes range from 2 to 15 percent. The mean annual precipitation is about 50 inches, and the mean annual air temperature is about 53 degrees F.

These soils are classified as clayey, mixed, isomesic Aquic Hapludults.

Typical pedon of Shinglemill loam, in an area of Shinglemill-Gibney complex, 2 to 9 percent slopes; 1,900 feet north and 400 feet west of the southeast corner of sec. 21, T. 17 N., R. 17 W., MDBM, Mendocino quadrangle:

Oi—2 inches to 0; litter of bishop pine and manzanita.

E—0 to 3 inches; variegated light gray (10YR 7/2), light brownish gray (10YR 6/2), and very pale brown (10YR 7/4) loam, grayish brown (10YR 5/2) moist; moderate medium and coarse subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common very fine and fine and few medium roots; common very fine interstitial and tubular pores; 10 percent hard subrounded yellowish red (5YR 5/6) nodules (2 to 30 millimeters); very strongly acid (pH 4.5); clear wavy boundary.

BE—3 to 8 inches; variegated very pale brown (10YR 7/4) and reddish yellow (7.5YR 6/6) loam, yellowish brown (10YR 5/4) moist; moderate fine, medium, and coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine and few medium and coarse roots; common very fine interstitial and tubular pores; very strongly acid (pH 4.9); clear wavy boundary.

Bt1—8 to 15 inches; very pale brown (10YR 7/4) loam, yellowish brown (10YR 5/6) moist; moderate fine, medium, and coarse subangular blocky structure; hard, friable, sticky and plastic; few very fine, medium, and coarse and common fine roots; common very fine interstitial and tubular pores; few thin clay films on faces of peds and lining pores; very strongly acid (pH 4.6); clear wavy boundary.

Bt2—15 to 25 inches; light yellowish brown (10YR 6/4) clay, yellowish brown (10YR 5/6) moist; strong very fine angular blocky structure; hard, firm, very sticky and plastic; few fine and medium roots; few very fine interstitial and common very fine tubular pores; many moderately thick and thick clay films on faces of peds and lining pores; extremely acid (pH 4.2); gradual wavy boundary.

Btv1—25 to 31 inches; light yellowish brown (10YR 6/4) clay, yellowish brown (10YR 5/6) moist; common fine prominent light gray (2.5Y 7/2) mottles, light gray (2.5Y 7/2) moist; common fine and medium prominent red (10R 4/6) mottles, red (10R 4/6) moist; strong very fine, fine, and medium angular blocky structure; hard, firm, sticky and plastic; few fine roots; few very fine interstitial pores; continuous moderately thick and thick clay films on faces of peds and lining pores; most red mottles are soft natural plinthite with a firm moist consistence; very strongly acid (pH 4.6); gradual wavy boundary.

Btv2—31 to 50 inches; yellow (10YR 7/6) clay, brownish yellow (10YR 6/6) moist; common fine and medium prominent white (10YR 8/1) mottles, white (10YR 8/2) moist; common fine and medium prominent red (10R 4/6) mottles, red (10R 4/6) moist; strong medium and coarse angular blocky structure; few fine roots; few very fine interstitial pores; continuous moderately thick and thick clay films on faces of peds and lining pores; most red mottles are soft natural plinthite with a firm moist consistence; extremely acid (pH 4.1); diffuse wavy boundary.

2Bt—50 to 63 inches; brownish yellow (10YR 6/6) sandy clay, yellowish brown (10YR 5/6) moist; common fine and medium prominent white (10YR 8/2) mottles, light gray (10YR 7/2) moist; strong medium and coarse angular blocky structure; hard, firm, sticky and plastic; few fine roots; common very fine interstitial pores; continuous moderately thick and thick clay films on faces of peds and lining pores; 10 percent very hard red (2.5YR 4/6) nodules (5 to 60 millimeters); very strongly acid (pH 4.5).

The depth to bedrock is more than 60 inches. The mean annual soil temperature ranges from 50 to 56

degrees F. The difference between the mean summer and mean winter soil temperatures ranges from 6 to 9 degrees F. The soil between the depths of 7 and 21 inches is moist in all parts from November 1 to August 15 and is dry in some part from September 1 to October 1 in most years. The soil is saturated with water for long periods following episodes of heavy rain from December through April. The saturated zone starts between the depths of 12 and 30 inches and extends to a depth of more than 60 inches. The soil is not saturated above a depth of 60 inches from summer through early fall. Reaction is extremely acid or very strongly acid.

The E horizon has color of 10YR 5/1, 6/1, 6/2, 7/2, 7/3, or 7/4. Moist color is 10YR 5/1, 5/2, 5/3, 6/1, 6/2, or 6/3. The content of clay ranges from 7 to 15 percent. The content of nodules ranges from 2 to 15 percent. In some pedons the horizon is slightly smeary and slightly brittle under moist conditions.

The BE horizon has color of 10YR 6/4, 6/6, 7/1, or 7/4 or 7.5YR 5/8 or 6/6. Moist color is 10YR 5/4, 6/2, 6/6, or 6/8. The texture is loam or sandy clay loam. The content of clay ranges from 10 to 27 percent. The content of nodules ranges from 0 to 15 percent. In some pedons the horizon is slightly smeary and slightly brittle under moist conditions.

The Bt horizon has color of 5Y 6/1 or 7/1, 2.5Y 6/1 or 7/1, or 10YR 6/4, 6/6, 7/1, 7/2, 7/4, or 7/6. Moist color is 5Y 5/1, 6/1, or 7/1; 2.5Y 5/2, 5/4, or 6/2; 10YR 5/4, 5/6, 6/4, 6/6, or 6/8; or 7.5YR 5/8. Mottles have dry color of 2.5Y 7/2; 10YR 8/1 or 8/2; 7.5YR 4/6, 5/6, or 5/8; 5YR 5/8; or 10R 4/6 or 4/8 and moist color of 2.5Y 6/2 or 7/2; 10YR 5/8, 6/4, 7/2, or 8/2; 7.5YR 5/8; or 10R 4/6 or 4/8. Grayish colors occur with brownish and reddish colors in a regular reticulate pattern within a depth of 15 to 30 inches and continuing to a depth of 60 inches or more. The Bt horizon is loam, clay loam, clay, or sandy clay. The content of clay ranges from 20 to 60 percent. The content of soft plinthite ranges from 0 to 20 percent. Base saturation ranges from 10 to 35 percent.

Shortyork Series

The Shortyork series consists of well drained soils that are moderately deep to bedrock. These soils formed in material weathered from schist or sandstone. They are on mountains. Slopes range from 9 to 50 percent. The mean annual precipitation is about 65 inches, and the mean annual air temperature is about 57 degrees F.

The Shortyork soils in this survey area are taxadjuncts because they have lower base saturation in the Bt and C horizons than is defined as the range for the series. These soils are classified as loamy-skeletal, mixed, thermic Ultic Haploxeralfs.

Typical pedon of Shortyork loam, in an area of Shortyork-Yorkville-Witherell complex, 15 to 30 percent slopes; 800 feet south and 1,600 feet east of the northwest corner of sec. 26, T. 23 N., R. 15 W., MDBM, Tan Oak Park quadrangle:

A—0 to 4 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate very fine and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine interstitial pores; 5 percent hard gravel; moderately acid (pH 6.0); clear wavy boundary.

Bt1—4 to 11 inches; yellowish brown (10YR 5/4) very cobbly clay loam, dark brown (10YR 3/3) moist; moderate fine, medium, and coarse subangular blocky structure; slightly hard, friable, slightly sticky and plastic; common very fine and few fine roots; common very fine and fine tubular and interstitial pores; few thin clay films lining pores; 20 percent hard gravel, 20 percent hard cobbles, and 5 percent stones; moderately acid (pH 5.7); gradual wavy boundary.

Bt2—11 to 21 inches; light yellowish brown (10YR 6/4) very gravelly clay loam, dark brown (10YR 4/3) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, sticky and plastic; few very fine and fine roots; common very fine and fine tubular and interstitial pores; few thin clay films on faces of peds and lining pores; 30 percent hard gravel, 10 percent cobbles, and 5 percent stones; strongly acid (pH 5.5); gradual wavy boundary.

C—21 to 31 inches; very pale brown (10YR 7/4) extremely gravelly sandy loam, yellowish brown (10YR 5/4) moist, massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine and fine interstitial pores; 60 percent hard gravel and 10 percent cobbles; strongly acid (pH 5.5); gradual wavy boundary.

R—31 to 39 inches; hard, fractured schist; fractures are less than 1 millimeter wide and are 3 to 5 millimeters apart.

The depth to hard bedrock ranges from 20 to 40 inches. The mollic epipedon is 7 to 12 inches thick and has 1 to 3 percent organic matter. The mean annual soil temperature ranges from 59 to 61 degrees F. The soil between the depths of 6 inches and 20 inches is moist in all parts from November 1 to May 15 and is dry in all parts from July 1 to October 1 in most years.

The A horizon has color of 10YR 4/2, 4/3, 5/2, 5/3, or 5/4. Moist color is 10YR 2/2, 3/2, or 3/3. The content of clay ranges from 20 to 27 percent. The content of gravel ranges from 5 to 15 percent. Base saturation ranges from 50 to 70 percent. Reaction is moderately acid or slightly acid.

The Bt horizon has color of 10YR 5/3, 5/4, 6/3, or 6/4. Moist color is 10YR 3/2, 3/3, 4/3, or 4/4. The texture is very gravelly clay loam or very cobbly clay loam that contains 27 to 35 percent clay. The content of rock fragments ranges from 35 to 60 percent. Base saturation ranges from 35 to 50 percent. Reaction ranges from strongly acid to slightly acid.

The content of clay in the C horizon ranges from 10 to 20 percent. The content of total rock fragments ranges from 60 to 80 percent. Base saturation ranges from 35 to 50 percent. Reaction is strongly acid or moderately acid.

Sirdrak Series

The Sirdrak series consists of very deep, somewhat excessively drained soils that formed in eolian sands. These soils are on stabilized sand dunes. Slopes range from 0 to 15 percent. The mean annual precipitation is about 40 inches, and the mean annual air temperature is about 53 degrees F.

These soils are classified as sandy, mixed, isomesic Ustic Dystropepts.

Typical pedon of Sirdrak loamy sand, 0 to 15 percent slopes, about 2,000 feet north and 1,950 feet east of the southwest corner of sec. 9, T. 19 N., R. 17 W., MDBM, Inglenook quadrangle:

A1—0 to 4 inches; brown (10YR 4/3) loamy sand, dark brown (10YR 3/3) moist; weak very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine interstitial pores; moderately acid (pH 6.0); clear wavy boundary.

A2—4 to 11 inches; brown (10YR 4/3) loamy sand, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine tubular and interstitial pores; moderately acid (pH 6.0); clear wavy boundary.

C1—11 to 24 inches; yellowish brown (10YR 5/6) loamy sand, dark yellowish brown (10YR 4/4) moist; weak very fine and fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; common very fine tubular and interstitial pores; moderately acid (pH 6.0); clear wavy boundary.

C2—24 to 30 inches; yellowish brown (10YR 5/6) loamy sand, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine and few medium roots; few very fine tubular and common very fine interstitial pores; moderately acid (pH 6.0); clear wavy boundary.

C3—30 to 45 inches; pale yellow (5Y 7/3) sand, pale olive (5Y 6/3) moist; few fine distinct brownish yellow (10YR 6/8) mottles, yellowish brown (10YR 5/8) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; common very fine interstitial pores; slightly acid (pH 6.3); clear wavy boundary.

C4—45 to 65 inches; light gray (5Y 7/2) sand, olive (5Y 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; common very fine interstitial pores; slightly acid (pH 6.5).

The depth to bedrock is more than 60 inches. The umbric epipedon is 10 to 20 inches thick and has 1 to 5 percent organic matter. The mean annual soil temperature ranges from 50 to 56 degrees F. The difference between the mean summer and mean winter soil temperatures ranges from 4 to 9 degrees F. The soil between the depths of 12 and 36 inches is moist in all parts from November 1 to June 1 and is dry in some or all parts from July 1 to October 15 in most years. The texture is loamy sand or sand throughout, and the content of clay ranges from 0 to 5 percent. Reaction is moderately acid or slightly acid throughout.

The A horizon has moist color of 10YR 3/2 or 3/3.

The C horizon has color of 5Y 7/2 or 7/3, 2.5Y 7/2 or 7/4, or 10YR 6/4, 5/6, or 6/6. Moist color is 5Y 5/3 or 6/3, 2.5Y 5/4, or 10YR 4/4 or 5/4.

Snook Series

The Snook series consists of somewhat excessively drained soils that are very shallow to bedrock. These soils formed in material weathered from sandstone or shale. They are on mountains. Slopes range from 30 to 75 percent. The mean annual precipitation is about 60 inches, and the mean annual air temperature is about 55 degrees F.

These soils are classified as loamy, mixed, nonacid, thermic Lithic Xerorthents.

Typical pedon of Snook loam, in an area of Garcia-Snook-Gube complex, 50 to 75 percent slopes; 750

feet south and 1,200 feet east of the northwest corner of sec. 4, T. 13 N., R. 15 W., MDBM, Navarro Southeast quadrangle:

A—0 to 6 inches; pale brown (10YR 6/3) loam, dark yellowish brown (10YR 3/4) moist; weak fine and medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; common very fine and fine and few coarse roots; few very fine and fine interstitial pores; 10 percent hard angular gravel; moderately acid (pH 5.6); clear wavy boundary.

R—6 to 15 inches; hard, highly fractured sandstone; fractures are 1 to 2 millimeters wide and are 1 to 10 millimeters apart; few fine and coarse roots along fractures.

The depth to hard bedrock ranges from 4 to 10 inches. The mean annual soil temperature ranges from 59 to 62 degrees F. The soil is moist in all parts from November 1 to May 1 and is dry in all parts from June 1 to October 15 in most years.

The A horizon has color of 10YR 6/2, 6/3, or 6/4. Moist color is 10YR 3/4, 4/3, or 4/4. The content of clay ranges from 10 to 25 percent. The content of gravel ranges from 5 to 15 percent. Reaction is moderately acid or slightly acid. About 30 to 65 percent of the surface is covered with gravel.

Squawrock Series

The Squawrock series consists of well drained soils that are moderately deep to bedrock. These soils formed in material weathered from sandstone. They are on hills and mountains. Slopes range from 15 to 75 percent. The mean annual precipitation is about 55 inches, and the mean annual air temperature is about 57 degrees F.

These soils are classified as loamy-skeletal, mixed, thermic Mollic Haploxeralfs.

Typical pedon of Squawrock gravelly loam, in an area of Squawrock-Garcia-Witherell complex, 50 to 75 percent slopes; 700 feet south and 1,500 feet west of the northeast corner of sec. 24, T. 12 N., R. 14 W., MDBM, Ornbaun Valley Northeast quadrangle:

A—0 to 7 inches; pale brown (10YR 6/3) gravelly loam, dark brown (10YR 3/3) moist; weak very fine and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine and few fine and medium tubular and interstitial pores; 20 percent gravel (2 to 10 millimeters); strongly acid (pH 5.3); clear wavy boundary.

BA—7 to 18 inches; pale brown (10YR 6/3) very gravelly loam, dark brown (10YR 4/3) moist; weak very fine and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine and few fine tubular and interstitial pores; 50 percent gravel (2 to 50 millimeters); strongly acid (pH 5.4); gradual wavy boundary.

Bt1—18 to 28 inches; very pale brown (10YR 7/4) very gravelly clay loam, yellowish brown (10YR 5/4) moist; strong fine angular blocky structure; hard, firm, sticky and plastic; few very fine roots; common very fine tubular and interstitial pores; many moderately thick clay films on faces of peds and lining pores; 35 percent gravel (2 to 50 millimeters); strongly acid (pH 5.4); clear wavy boundary.

Bt2—28 to 32 inches; variegated very pale brown (10YR 7/4) and yellowish brown (10YR 5/4) very gravelly clay loam, yellowish brown (10YR 5/4) moist; strong fine angular blocky structure; hard, firm, sticky and plastic; few very fine roots; common very fine tubular and interstitial pores; common thin clay films on faces of peds and lining pores; 45 percent gravel (2 to 70 millimeters); strongly acid (pH 5.4); abrupt wavy boundary.

R—32 to 39 inches; pale brown (10YR 6/3), hard, fractured sandstone; fractures are about 1 millimeter wide and are about 1 to 10 centimeters apart; few very fine roots along fractures; many moderately thick clay films on rock faces.

The depth to hard bedrock ranges from 20 to 40 inches. The mean annual soil temperature ranges from 59 to 62 degrees F. The soil between the depths of 10 and 31 inches, or between a depth of 10 inches and bedrock, is moist in all parts from November 1 to May 15 and is dry in all parts from July 1 to October 1 in most years. Reaction ranges from strongly acid to slightly acid throughout.

The A horizon has color of 10YR 6/2, 6/3, or 6/4. Moist color is 10YR 3/2 or 3/3. The content of clay ranges from 12 to 25 percent. The content of gravel ranges from 15 to 35 percent. Base saturation ranges from 60 to 80 percent.

The Bt horizon has color of 10YR 6/3, 6/4, or 7/4. Moist color is 10YR 4/3 or 5/4. The texture is very gravelly loam or very gravelly clay loam that contains 20 to 35 percent clay. The content of gravel ranges from 35 to 60 percent. Base saturation ranges from 75 to 90 percent.

Stornetta Series

The Stornetta series consist of very deep, moderately well drained soils that formed in alluvium derived from mixed rock sources. These soils are on coastal flood plains. Slopes range from 0 to 2 percent. The mean annual precipitation is about 40 inches, and the mean annual air temperature is about 53 degrees.

These soils are classified as fine-loamy, mixed, nonacid, isomesic Aquic Ustifluvents.

Typical pedon of Stornetta fine sandy loam, 0 to 2 percent slopes, 600 feet north and 300 feet east of the southwest corner of sec. 36, T. 13 N., R. 17 W., MDBM, Point Arena quadrangle:

Ap1—0 to 2 inches; light yellowish brown (2.5Y 6/4) fine sandy loam, brown (10YR 4/3) moist; massive; soft, very friable, slightly sticky and nonplastic; many very fine roots; many very fine interstitial and common very fine tubular pores; slightly alkaline (pH 7.8); abrupt smooth boundary.

Ap2—2 to 5 inches; light yellowish brown (2.5Y 6/4) loam, brown (10YR 4/3) moist; common fine distinct light brownish gray (2.5Y 6/2) mottles, grayish brown (2.5Y 5/2) moist; common fine distinct yellowish brown (10YR 5/6) mottles, yellowish brown (10YR 5/6) moist; massive; hard, friable, slightly sticky and plastic; many very fine roots; common very fine tubular and interstitial pores; slightly acid (pH 6.2); abrupt smooth boundary.

C1—5 to 22 inches; light yellowish brown (2.5Y 6/4) loam, dark brown (10YR 3/3) moist; moderate fine and medium subangular blocky structure; soft, friable, sticky and plastic; common very fine roots; common very fine tubular and interstitial pores; neutral (pH 6.8); gradual smooth boundary.

C2—22 to 37 inches; brown (10YR 5/3) loam, very dark brown (10YR 2/2) moist; weak fine, medium, and coarse subangular blocky structure; slightly hard, friable, slightly sticky and plastic; common very fine roots; common very fine tubular and interstitial pores; slightly acid (pH 6.4); gradual smooth boundary.

C3—37 to 62 inches; brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; massive; slightly hard, friable, sticky and slightly plastic; few very fine roots; common very fine tubular and interstitial pores; neutral (pH 6.8).

The depth to bedrock is more than 60 inches. The mean annual soil temperature ranges from 50 to 56 degrees F. The difference between the mean summer and mean winter soil temperatures ranges from 6 to 9 degrees F. The soil between the depths of 6 and 18 inches is moist in all parts from November 1 to June 1. The moisture control section is dry in some or all parts from July 1 to October 1 in most years. Reaction ranges from slightly acid to slightly alkaline throughout.

The Ap horizon has color of 2.5Y 6/4 or 10YR 5/3 or 6/4. Moist color is 10YR 3/3 or 4/3. Mottles are between the depths of 2 and 10 inches. They have dry color of 2.5Y 6/2 or 10YR 5/6 or 5/8 and moist color of 2.5Y 5/2 or 10YR 5/6. The content of clay ranges from 10 to 20 percent.

The C horizon has color of 2.5Y 6/4 or 10YR 5/3. Moist color is 10YR 2/2 or 3/3. The texture is stratified fine sandy loam, silt loam, and loam. The content of clay ranges from 18 to 27 percent.

Talmage Series

The Talmage series consists of very deep, somewhat excessively drained soils that formed in alluvium derived from mixed rock sources. These soils are on river terraces. Slopes range from 0 to 2 percent. The mean annual precipitation is about 50 inches, and the mean annual air temperature is about 55 degrees F.

The Talmage soils in this survey area are taxadjuncts because they have lower base saturation and lower pH in the C horizon than are defined as the range for the series. These soils are classified as loamy-skeletal, mixed, thermic Fluventic Xerochrepts.

Typical pedon of Talmage gravelly loam, 0 to 2 percent slopes, 2,225 feet north and 1,325 feet west of the southeast corner of sec. 13, T. 14 N., R. 15 W., MDBM, Boonville Southwest quadrangle:

A1—0 to 5 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; strong very fine and fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine, fine, and medium and few coarse roots; few very fine and fine tubular and many very fine and fine interstitial pores; 30 percent hard rounded gravel; moderately acid (pH 6.0); clear wavy boundary.

A2—5 to 12 inches; brown (10YR 5/3) gravelly loam, dark brown (10YR 3/3) moist; weak fine subangular blocky and moderate very fine and fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; few fine tubular and common very fine and fine interstitial pores; 20

percent hard rounded gravel; moderately acid (pH 5.6); gradual smooth boundary.

C1—12 to 19 inches; yellowish brown (10YR 5/4) very gravelly loam, dark yellowish brown (10YR 4/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine and common medium roots; common very fine, fine, and medium tubular and common very fine and fine interstitial pores; 50 percent hard rounded gravel; 3 percent hard rounded cobbles; very strongly acid (pH 4.7); clear wavy boundary.

C2—19 to 61 inches; light yellowish brown (10YR 6/4) extremely gravelly loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common medium roots; common very fine and fine tubular and interstitial pores; 60 percent hard rounded gravel; 20 percent hard rounded cobbles; very strongly acid (pH 4.7).

The depth to bedrock is more than 60 inches. The mollic epipedon is 10 to 19 inches thick and has 1 to 3 percent organic matter. The mean annual soil temperature ranges from 59 to 62 degrees F. The soil between the depths of 9 and 59 inches is moist in all parts from January 1 to May 1 and is dry in all parts from June 15 to October 15 in most years.

The A horizon has color of 10YR 4/2, 5/2, or 5/3. Moist color is 10YR 3/2 or 3/3. The content of clay ranges from 8 to 18 percent. The content of gravel ranges from 15 to 35 percent. Base saturation ranges from 50 to 65 percent. Reaction is moderately acid or slightly acid.

The C horizon has color of 10YR 5/3, 5/4, 6/3, or 6/4. Moist color is 10YR 4/4 or 5/4. The texture is stratified gravelly loam to extremely gravelly coarse sandy loam, and the content of clay ranges from 8 to 18 percent. The content of gravel ranges from 35 to 70 percent. The content of cobbles ranges from 0 to 25 percent. The total content of coarse fragments ranges from 35 to 90 percent. Base saturation ranges from 30 to 50 percent. Reaction is very strongly acid or strongly acid.

Threechop Series

The Threechop series consists of well drained soils that are deep to weathered bedrock. These soils formed in material weathered from sandstone and mudstone. They are on hills and mountains. Slopes range from 9 to 30 percent. The mean annual precipitation is about 60 inches, and the mean annual air temperature is about 53 degrees F.

These soils are classified as clayey, mixed, isomesic Ustic Haplohumults.

Typical pedon of Threechop loam, in an area of Threechop-Ornbaun complex, 9 to 30 percent slopes; 1,500 feet north and 1,700 feet west of the southeast corner of sec. 29, T. 18 N., R. 15 W., MDBM, Comptche Northeast quadrangle:

Oi—1 inch to 0; tanoak litter.

A—0 to 8 inches; very pale brown (10YR 7/3) loam, yellowish brown (10YR 5/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine and few medium roots; common very fine tubular and interstitial pores; 5 percent soft gravel; strongly acid (pH 5.2); clear wavy boundary.

Bt1—8 to 12 inches; variegated very pale brown (10YR 7/4) and reddish yellow (7.5YR 6/6) clay loam, strong brown (7.5YR 4/6) moist; moderate medium subangular blocky structure; hard, friable, sticky and slightly plastic; common very fine and fine and few medium roots; common very fine interstitial and few very fine and fine tubular pores; few thin clay films on faces of peds and lining pores; 5 percent soft gravel; strongly acid (pH 5.2); gradual wavy boundary.

Bt2—12 to 17 inches; variegated reddish yellow (7.5YR 6/6) and yellowish red (5YR 5/6) clay, yellowish red (5YR 5/6) and reddish brown (5YR 4/4) moist; weak medium and coarse subangular blocky structure parting to weak medium angular blocky; hard, firm, sticky and plastic; few fine, medium, and coarse roots; few fine tubular and common very fine interstitial pores; common thin and moderately thick clay films on faces of peds and lining pores; 5 percent soft gravel; very strongly acid (pH 5.0); gradual wavy boundary.

Bt3—17 to 26 inches; variegated pink (7.5YR 7/4) and yellowish red (5YR 5/6) clay, yellowish red (5YR 4/6) and reddish brown (5YR 4/3) moist; moderate medium and coarse subangular blocky structure parting to moderate medium and coarse angular blocky; very hard, firm, sticky and plastic; few fine, medium, and coarse roots; few very fine tubular and interstitial pores; many moderately thick clay films on faces of peds and lining pores; 5 percent soft gravel; very strongly acid (pH 4.9); gradual wavy boundary.

Bt4—26 to 32 inches; variegated reddish yellow (7.5YR 6/8 and 5YR 6/6) clay, yellowish red (5YR 5/6) and reddish brown (5YR 4/4) moist; moderate medium and coarse subangular blocky structure; very hard, firm, sticky and plastic; few fine, medium, and coarse roots; common very

fine tubular and few very fine interstitial pores; many moderately thick clay films on faces of peds and lining pores; 5 percent soft gravel; very strongly acid (pH 5.0); gradual wavy boundary.

Bt5—32 to 42 inches; variegated yellowish red (5YR 5/8) and very pale brown (10YR 8/3) clay, yellowish red (5YR 5/6), reddish brown (5YR 4/4), and yellow (10YR 8/6) moist; weak medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few medium and coarse roots; few very fine tubular and interstitial pores; many moderately thick and few thick clay films on faces of peds and lining pores; 5 percent soft gravel; strongly acid (pH 5.1); gradual wavy boundary.

Cr—42 to 57 inches; variegated white (10YR 8/2) and yellowish red (5YR 5/6), fractured, soft mudstone and sandstone; fractures are less than 1 millimeter wide and are 1 to 4 centimeters apart; few coarse roots along fractures; many moderately thick and few thick clay films on fracture faces.

The depth to soft bedrock ranges from 40 to 60 inches. The content of organic carbon in the upper meter averages 0.8 to 1.5 percent. The mean annual soil temperature ranges from 52 to 56 degrees F. The difference between the mean summer and mean winter soil temperatures ranges from 3 to 8 degrees F. The soil between the depths of 7 and 20 inches is moist in all parts from November 1 to June 1 and is dry in some or all parts from July 1 to October 1 in most years. The content of gravel ranges from 2 to 10 percent throughout.

The A horizon has color of 10YR 6/3, 7/3, or 7/4 or 7.5YR 4/4, 5/4, or 7/3. Moist color is 10YR 4/3, 5/4, or 5/6 or 7.5YR 4/6. The content of clay ranges from 18 to 27 percent. Base saturation ranges from 40 to 60 percent. Reaction is strongly acid or moderately acid.

The Bt horizon has variegated colors of 10YR 7/4, 8/3, or 8/4; 7.5YR 5/6, 5/8, 6/6, 6/8, 7/3, 7/4, or 7/6; or 5YR 4/3, 4/4, 4/6, 5/6, 5/8, or 6/6. Moist color is 10YR 5/6 or 8/6; 7.5YR 4/4, 4/6, 5/4, or 5/6; or 5YR 4/3, 4/4, 4/6, 5/6, or 5/8. This horizon is clay loam or clay. The content of clay ranges from 27 to 60 percent. Base saturation ranges from 10 to 50 percent. Reaction ranges from very strongly acid to moderately acid.

Tramway Series

The Tramway series consists of well drained soils that are moderately deep to weathered bedrock. These soils formed in material weathered from sandstone. They are on hills. Slopes range from 9 to 75 percent. The mean annual precipitation is about 55 inches, and the mean annual air temperature is about 53 degrees F.

These soils are classified as fine-loamy, mixed, isomesic Ultic Hapludalfs.

Typical pedon of Tramway loam, in an area of Irmulco-Tramway complex, 30 to 50 percent slopes; 500 feet south and 2,600 feet east of the northwest corner of sec. 13, T. 17 N., R. 16 W., MDBM, Comptche Southeast quadrangle:

Oi—2 inches to 0; litter of redwood, Douglas-fir, and tanoak.

A—0 to 7 inches; light brownish gray (10YR 6/2) loam, very dark grayish brown (10YR 3/2) moist; strong medium subangular blocky and moderate fine granular structure; hard, very friable, slightly sticky and slightly plastic; common fine, medium, and coarse and few very fine roots; few very fine tubular and common fine interstitial pores; 10 percent concretions; moderately acid (pH 6.0); clear wavy boundary.

BAt—7 to 12 inches; pale brown (10YR 6/3) loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine and common medium and coarse roots; few fine interstitial and very fine tubular pores; common thin clay films on faces of peds and lining pores; 5 percent concretions; moderately acid (pH 5.8); clear wavy boundary.

Bt1—12 to 18 inches; light yellowish brown (10YR 6/4) clay loam, dark yellowish brown (10YR 4/4) moist; weak medium and coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine and common medium and coarse roots; few fine interstitial and few very fine tubular pores; many thin clay films on faces of peds and lining pores; 5 percent concretions; strongly acid (pH 5.5); gradual wavy boundary.

Bt2—18 to 28 inches; light yellowish brown (10YR 6/4) clay loam, dark yellowish brown (10YR 4/4) moist; weak medium and coarse subangular blocky structure; hard, firm, slightly sticky and plastic; few fine and common medium and coarse roots; few fine interstitial pores; many moderately thick clay films on faces of peds and lining pores; 5 percent concretions; strongly acid (pH 5.2); gradual irregular boundary.

Crt—28 to 41 inches; light yellowish brown (10YR 6/4), highly weathered, fractured sandstone; few medium and coarse roots along fractures; continuous moderately thick clay films on fracture faces.

The depth to soft bedrock ranges from 20 to 40 inches. The mean annual soil temperature ranges from 50 to 56 degrees F. The difference between the mean summer and mean winter soil temperatures ranges from 3 to 6 degrees F. The soil between the depths of 7 and 19 inches is moist in all parts from November 1 to August 15 and is dry in some part from September 1 to October 1 in most years. Reaction ranges from strongly acid to slightly acid throughout.

The A horizon has color of 10YR 5/2, 5/3, 6/2, 6/3, or 7/3. Moist color is 10YR 3/2, 3/3, 4/2, 4/3, or 4/4. The content of clay ranges from 15 to 20 percent. The content of gravel ranges from 0 to 15 percent.

The Bt horizon has color of 10YR 5/3, 6/3, 6/4, 7/4, or 7/6 or 7.5YR 6/4 or 6/6. Moist color is 10YR 4/3, 4/4, 5/3, or 5/4 or 7.5YR 4/2 or 4/4. The texture is loam, clay loam, or gravelly clay loam. The content of clay ranges from 20 to 35 percent. The content of gravel ranges from 0 to 25 percent. Base saturation ranges mainly from 40 to 75 percent but is less than 60 percent in the lower part of the Bt horizon.

Tregoning Series

The Tregoning series consists of poorly drained soils that are moderately deep to a hardpan. These soils formed in eolian sands. They are on marine terraces. Slopes range from 0 to 15 percent. The mean annual precipitation is about 50 inches, and the mean annual air temperature is about 53 degrees F.

These soils are classified as coarse-loamy, mixed, nonacid, isomesic Typic Tropaquepts.

Typical pedon of Tregoning sandy loam, in an area of Tregoning-Cleone complex, 0 to 5 percent slopes; 400 feet south and 200 feet east of the northwest corner of sec. 19, T. 18 N., R. 17 W., MDBM, Fort Bragg quadrangle:

Oi—2 inches to 0; partially decomposed litter of bishop pine and tanoak.

A1—0 to 5 inches; gray (10YR 5/1) sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium subangular blocky structure; soft, friable, slightly sticky and nonplastic; common very fine and fine and few medium and coarse roots; many very fine interstitial and few fine tubular pores; extremely acid (pH 4.2); clear wavy boundary.

A2—5 to 9 inches; gray (10YR 6/1) sandy loam, dark brown (10YR 3/3) moist; weak fine and medium subangular blocky structure; soft, friable, slightly sticky and nonplastic; common fine and medium and few coarse roots; common very fine interstitial and few very fine tubular pores; extremely acid (pH 4.2); clear wavy boundary.

E—9 to 15 inches; light gray (10YR 7/1) sandy loam, light brownish gray (2.5Y 6/2) moist; massive; slightly hard, firm, slightly sticky and nonplastic; slightly smeary; common fine and medium and few coarse roots; few very fine interstitial and tubular pores; extremely acid (pH 4.2); abrupt wavy boundary.

Bg—15 to 23 inches; light gray (5Y 7/1), brittle loamy sand, grayish brown (2.5Y 5/2) moist; common fine and medium distinct very pale brown (10YR 7/3) mottles, yellowish brown (10YR 5/6) moist; ped faces are stained dark brown (7.5YR 4/2) with humic material; strong fine and medium subangular blocky structure; hard, very firm, nonsticky and nonplastic; few very fine and fine roots; few very fine interstitial and tubular pores; strongly acid (pH 5.5); abrupt wavy boundary.

Bhsm—23 to 45 inches; light gray (2.5Y 7/2), strongly cemented loamy sand after crushing, grayish brown (2.5Y 5/2) moist; common coarse distinct light yellowish brown (10YR 6/4) and common medium and coarse distinct brown (7.5YR 5/4) mottles, yellowish brown (10YR 5/6) and dark brown (7.5YR 4/4) moist; massive; slightly acid (pH 6.5); gradual wavy boundary.

Bsm—45 to 62 inches; pale brown (10YR 6/3), weakly cemented sand after crushing and wetting, light olive brown (2.5Y 5/4) moist; massive; slightly acid (pH 6.4).

The depth to bedrock is more than 80 inches. The depth to a hardpan ranges from 20 to 40 inches. The mean annual soil temperature ranges from 50 to 56 degrees F. The difference between the mean summer and mean winter soil temperatures ranges from 6 to 9 degrees F. The soil is saturated with water for long periods following episodes of heavy rain from December through April. The saturated zone begins between the depths of 12 and 30 inches and extends to the top of the hardpan. The soil is not saturated above the hardpan from summer through early fall. Base saturation ranges from 5 to 30 percent throughout.

The A horizon has color of 10YR 5/1 or 6/1. Moist color is 10YR 3/1, 3/2, or 3/3. The content of clay ranges from 5 to 12 percent. Reaction is extremely acid or very strongly acid.

The E horizon has color of 10YR 7/1 or 8/1. Moist color is 2.5Y 6/2 or 10YR 5/2, 6/1, or 6/2. The texture is loamy sand or sandy loam. The content of clay ranges from 3 to 12 percent. Reaction is extremely acid or very strongly acid.

The Bg horizon has color of 5Y 7/1 or 2.5Y 6/2 or

7/2. Moist color is 2.5Y 5/2, 6/1, or 6/2. Mottles have dry color of 10YR 7/3, 7/4, or 7/6 and moist color of 10YR 5/6 or 6/6. The content of clay ranges from 3 to 10 percent. The content of nodules ranges from 0 to 15 percent. Reaction is strongly acid or moderately acid.

The Bhsm horizon has color of 2.5Y 6/2 or 7/2 or 10YR 5/2 or 5/3. Moist color is 2.5Y 4/2 or 5/2 or 10YR 4/1, 4/2, or 4/3. Mottles have dry color of 10YR 6/4 or 6/6 or 7.5YR 5/4 and moist color of 10YR 5/6 or 5/8 or 7.5YR 4/4. The content of clay ranges from 3 to 10 percent. Reaction is moderately acid or slightly acid.

The Bsm horizon has color of 10YR 6/3, 7/3, or 7/4. Moist color is 2.5Y 5/4 or 10YR 5/4. The content of clay ranges from 0 to 5 percent. Reaction is moderately acid or slightly acid.

Tropaquepts

Tropaquepts are very deep, very poorly drained soils on marine terraces. These soils formed in marine sediments. Slopes are 0 to 15 percent. The mean annual precipitation is about 55 inches, and the mean annual air temperature is about 53 degrees F.

Reference pedon of Tropaquepts, 0 to 15 percent slopes, 850 feet north and 1,250 feet west of the southeast corner of sec. 7, T. 17 N., R. 17 W., MDBM, Mendocino quadrangle:

A—0 to 7 inches; dark gray (10YR 4/1) clay loam, black (10YR 2/1) moist; moderate very coarse angular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; common fine, medium, and coarse and many very fine roots; common very fine and fine tubular and interstitial pores; very strongly acid (pH 4.5); abrupt irregular boundary.

Bg1—7 to 16 inches; light gray (10YR 7/1) clay, gray (10YR 5/1) moist; common fine, medium, and coarse prominent brownish yellow (10YR 6/6) mottles, brownish yellow (10YR 6/8) moist; moderate coarse angular blocky structure; hard, very firm, very sticky and plastic; common very fine, fine, and medium roots; few very fine and fine tubular pores; very strongly acid (pH 4.5); clear wavy boundary.

Bg2—16 to 24 inches; light gray (10YR 6/1) clay, gray (10YR 5/1) moist; common fine, medium, and coarse prominent brownish yellow (10YR 6/6) mottles, brownish yellow (10YR 6/8) moist; moderate medium and coarse angular blocky structure; hard, very firm, very sticky and plastic; few very fine and fine roots; few very fine tubular and common very fine interstitial pores; very strongly acid (pH 4.5); abrupt wavy boundary.

Bg3—24 to 29 inches; gray (10YR 5/1) sandy clay loam, very dark gray (10YR 3/1) moist; weak fine and medium angular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; few very fine and fine roots; few very fine tubular and common very fine interstitial pores; very strongly acid (pH 5.0); abrupt wavy boundary.

2CBg—29 to 34 inches; light gray (5Y 6/1) loamy sand, dark gray (5Y 4/1) moist; weak coarse angular blocky structure; soft, very friable, slightly sticky and nonplastic; few very fine roots; few very fine tubular and interstitial pores; neutral (pH 6.7); clear wavy boundary.

2Cg—34 to 43 inches; light brownish gray (2.5Y 6/2) sand, grayish brown (2.5Y 5/2) moist; massive; soft, loose, nonsticky and nonplastic; few very fine roots; neutral (pH 6.7); abrupt broken boundary.

2C—43 to 45 inches; pale yellow (2.5Y 7/4) sand, light olive brown (2.5Y 5/4) moist; common medium prominent strong brown (7.5YR 5/6) mottles, strong brown (7.5YR 4/6) moist; massive; loose, nonsticky and nonplastic; neutral (pH 6.7); abrupt irregular boundary.

2C´g—45 to 63 inches; light brownish gray (2.5Y 6/2) sand, dark grayish brown (2.5Y 4/2) moist; massive; loose, nonsticky and nonplastic; neutral (pH 6.7).

Depth is more than 60 inches. The mean annual soil temperature ranges from 50 to 56 degrees F. The difference between the mean summer and mean winter soil temperatures ranges from 3 to 6 degrees F. The soils are moist or wet throughout the year. They are continuously saturated with water from December through April. The saturated zone starts between the surface and a depth of 10 inches and extends to a depth of more than 60 inches. Water may be ponded for brief or extended periods following episodes of heavy rain. Reaction ranges from very strongly acid to neutral throughout.

The A horizon has color of 10YR 4/1, 4/2, or 5/2. Moist color is 2.5Y 3/2 or 10YR 2/1, 3/1, or 4/1. The content of clay ranges from 5 to 35 percent.

The Bg horizon has color of 5Y 6/1 or 10YR 5/1, 6/1, 6/2, or 7/1. Moist color is 2.5Y 5/2; 5Y 4/1, 5/1, or 6/1; or 10YR 3/1, 4/1, or 5/1. Mottles have dry color of 10YR 5/2, 6/6, 6/8, or 7/6 and moist color of 7.5YR 3/2 or 10YR 5/3, 5/4, 6/6, 6/8, or 7/6. The Bg horizon is loamy sand, sandy loam, sandy clay loam, sandy clay, silty clay, or clay that contains 5 to 45 percent clay.

The C horizon has color of 2.5Y 6/2, 7/4, or 8/2 or 5B 5/1, 6/1, 7/1, or 7/4. Moist color is 2.5Y 4/2 or 5/2 or 5B 5/1, 6/1, or 7/1. Mottles have dry color of 7.5YR 5/6 or 5/8 and moist color of 7.5YR 4/6, 10YR 7/6, or 5YR 5/6 or 5/8. The C horizon is sand, loamy sand, sandy loam, sandy clay loam, sandy clay, or clay that contains 2 to 45 percent clay.

Tyson Series

The Tyson series consists of well drained soils that are moderately deep to bedrock. These soils formed in material weathered from sandstone. They are on mountains. Slopes range from 9 to 50 percent. The mean annual precipitation is about 65 inches, and the mean annual air temperature is about 54 degrees F.

These soils are classified as loamy-skeletal, mixed, mesic Typic Xerumbrepts.

Typical pedon of Tyson gravelly loam, in an area of Tyson-Updegraff complex, 30 to 50 percent slopes; 2,000 feet north and 660 feet east of the southwest corner of sec. 3, T. 23 N., R. 15 W., MDBM, Tan Oak Park quadrangle:

Oi—1/2 inch to 0; litter of Oregon white oak.

A1—0 to 4 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark brown (10YR 2/2) moist; strong fine and medium granular structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots; many very fine and fine interstitial pores; 25 percent angular gravel; 5 percent angular cobbles; slightly acid (pH 6.3); gradual wavy boundary.

A2—4 to 9 inches; dark brown (10YR 3/3) very gravelly loam, very dark brown (10YR 2/2) moist; moderate very fine and fine granular structure; slightly hard, very friable, nonsticky and nonplastic; few very fine, common medium, and many fine roots; many very fine and fine interstitial pores; 40 percent angular gravel; 5 percent angular cobbles; moderately acid (pH 6.0); gradual wavy boundary.

BA—9 to 17 inches; brown (10YR 5/3) very gravelly loam, very dark grayish brown (10YR 3/2) moist; weak very fine and fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common fine and medium and few very fine roots; common very fine and fine interstitial pores; 40 percent angular gravel; 5 percent angular cobbles; strongly acid (pH 5.5); clear wavy boundary.

Bw—17 to 21 inches; pale brown (10YR 6/3) very gravelly clay loam, dark brown (10YR 3/3) moist; weak very fine and fine subangular blocky structure; hard, friable, slightly sticky and nonplastic; common fine roots; common very fine and fine interstitial pores; 50 percent angular gravel; 5 percent angular cobbles; strongly acid (pH 5.6); abrupt wavy boundary.

R—21 inches; hard, fractured sandstone; fractures are about 3 to 6 millimeters wide and are 1 to 5 centimeters apart.

The depth to hard bedrock ranges from 20 to 40 inches. The umbric epipedon is 10 to 18 inches thick and has 1 to 3 percent organic carbon. The mean annual soil temperature ranges from 50 to 55 degrees F. The soil between the depths of 9 and 30 inches, or between a depth of 9 inches and bedrock, is moist in all parts from November 1 to May 15 and is dry in all parts from July 1 to October 1 in most years. Reaction is moderately acid or slightly acid throughout.

The A horizon has color of 10YR 3/3, 4/2, or 4/3. Moist color is 10YR 2/2 or 3/2. The content of clay ranges from 18 to 27 percent. The content of gravel ranges from 20 to 40 percent. The content of cobbles ranges from 0 to 10 percent. Base saturation ranges from 45 to 75 percent.

The Bw horizon has color of 10YR 5/3 or 6/3. Moist color is 10YR 3/2, 3/3, 4/2, or 4/3. The texture is very gravelly loam or very gravelly clay loam. The content of clay ranges from 20 to 30 percent. The content of gravel ranges from 40 to 50 percent. The content of cobbles ranges from 0 to 10 percent. Base saturation ranges from 30 to 50 percent.

Updegraff Series

The Updegraff series consists of well drained soils that are deep to bedrock. These soils formed in material weathered from schist. They are on hills and mountains. Slopes range from 9 to 50 percent. The mean annual precipitation is about 60 inches, and the mean annual air temperature is about 55 degrees F.

These soils are classified as fine-loamy, mixed, mesic Ultic Argixerolls.

Typical pedon of Updegraff loam, 30 to 50 percent slopes, 1,650 feet south and 2,300 feet east of the northwest corner of sec. 2, T. 17 N., R. 14 W., MDBM, Willits Southwest quadrangle:

Oi—1 inch to 0; decomposing litter of Douglas-fir and black oak.

A—0 to 4 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate very fine and fine subangular blocky

structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine and fine interstitial and tubular pores; 10 percent hard angular gravel; slightly acid (pH 6.5); clear wavy boundary.

Bt1—4 to 11 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, sticky and plastic; common very fine and fine roots; common very fine and fine interstitial and tubular pores; few thin clay films on faces of peds; 10 percent hard angular gravel; moderately acid (pH 6.0); clear wavy boundary.

Bt2—11 to 19 inches; pale brown (10YR 6/3) clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine, medium, and coarse subangular blocky structure; slightly hard, friable, sticky and plastic; few very fine and fine, common medium, and few coarse roots; common very fine and fine tubular and few very fine and fine interstitial pores; few moderately thick clay films on faces of peds and lining pores; 5 percent hard angular gravel; moderately acid (pH 5.7); gradual wavy boundary.

Bt3—19 to 29 inches; pale brown (10YR 6/3) clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine, medium, and coarse subangular blocky structure; slightly hard, firm, sticky and plastic; common very fine and fine and few medium roots; common very fine and fine tubular and few very fine and fine interstitial pores; common moderately thick clay films on faces of peds and lining pores; 5 percent hard angular gravel; moderately acid (pH 5.7); gradual wavy boundary.

Bt4—29 to 42 inches; pale brown (10YR 6/3) clay loam, dark grayish brown (10YR 4/2) moist; moderate fine, medium, and coarse subangular blocky structure; hard, firm, sticky and plastic; common very fine and fine and few medium roots; common very fine and fine tubular and few very fine and fine interstitial pores; common moderately thick clay films on faces of peds and lining pores; 5 percent hard angular gravel; moderately acid (pH 5.7); gradual wavy boundary.

Bt5—42 to 53 inches; light brownish gray (10YR 6/2) clay loam, dark grayish brown (10YR 4/2) moist; moderate fine, medium, and coarse subangular blocky structure; hard, firm, sticky and plastic; few very fine and fine roots; common very fine and fine tubular and few very fine and fine interstitial pores; common moderately thick clay films on faces of peds and lining pores; 5 percent hard angular gravel; moderately acid (pH 5.6); abrupt wavy boundary.

R—53 inches; hard, fractured schist; fractures are 3 to 6 centimeters apart and 1 to 2 millimeters wide; fine roots along fracture planes; clay films on rock faces.

The depth to hard bedrock ranges from 40 to 60 inches. The mollic epipedon is 10 to 15 inches thick and has 1 to 5 percent organic matter. The mean annual soil temperature ranges from 54 to 59 degrees F. The soil between the depths of 6 and 18 inches is moist in all parts from November 1 to May 15 and is dry in all parts from July 1 to October 1 in most years. Reaction is moderately acid or slightly acid throughout.

The A horizon has color of 10YR 4/2, 4/3, 5/2, or 5/3. Moist color is 10YR 2/2, 3/2, or 3/3. The content of clay ranges from 15 to 27 percent. The content of gravel ranges from 0 to 10 percent. Base saturation ranges from 50 to 70 percent.

The Bt horizon has color of 10YR 5/2, 5/3, 6/2, 6/3, or 6/4. Moist color is 10YR 3/2, 3/3, 4/2, or 4/3. The content of clay ranges from 27 to 40 percent. The content of gravel ranges from 0 to 10 percent. Base saturation ranges from 50 to 75 percent.

Usal Series

The Usal series consists of well drained soils that are moderately deep to bedrock. These soils formed in material weathered from sandstone and mudstone. They are on hills. Slopes range from 30 to 99 percent. The mean annual precipitation is about 50 inches, and the mean annual air temperature is about 53 degrees F.

These soils are classified as fine-loamy, mixed, isomesic Typic Argiudolls.

Typical pedon of Usal gravelly loam, in an area of Branscomb-Usal complex, 50 to 75 percent slopes; 2,500 feet south and 2,000 feet east of the northwest corner of sec. 27, T. 20 N., R. 17 W., MDBM, Dutchman's Knoll quadrangle:

Oi—2 inches to 0; litter of Douglas-fir, grand fir, and redwood; 5 percent gravel.

A—0 to 14 inches; brown (10YR 5/3) gravelly loam, dark brown (10YR 3/3) moist; strong fine and medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and few fine and medium roots; many very fine and fine and common medium

interstitial pores and common very fine tubular pores; 25 percent pebbles; neutral (pH 7.0); clear wavy boundary.

Bt1—14 to 21 inches; variegated light yellowish brown (10YR 6/4) and very pale brown (10YR 7/4) gravelly clay loam, dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/4) moist; strong fine and medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine and common medium and coarse roots; common very fine and few fine interstitial pores and few very fine tubular pores; many thin clay films on faces of peds and lining pores; 15 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.

Bt2—21 to 29 inches; very pale brown (10YR 7/4) gravelly clay loam, yellowish brown (10YR 5/6) moist; strong fine and medium angular blocky structure; hard, friable, sticky and plastic; few fine and common medium and coarse roots; few very fine and fine interstitial pores; many moderately thick clay films on faces of peds and lining pores; 15 percent gravel; slightly acid (pH 6.5); gradual irregular boundary.

Bt3—29 to 33 inches; light yellowish brown (10YR 6/4) very gravelly clay loam, yellowish brown (10YR 5/4) moist; moderate fine and medium angular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine and medium roots; few very fine and fine interstitial pores; many moderately thick clay films on faces of peds; 45 percent gravel; slightly acid (pH 6.5); abrupt irregular boundary.

R—33 to 37 inches; hard, fractured, fine grained sandstone and mudstone; fractures are 0.5 to 1.0 centimeter apart and are 1 to 2 millimeters wide.

The depth to hard bedrock ranges from 20 to 40 inches. The mollic epipedon is 10 to 18 inches thick and has 2 to 8 percent organic matter. The mean annual soil temperature ranges from 51 to 56 degrees F. The difference between the mean summer and mean winter soil temperatures ranges from 3 to 6 degrees F. The soil between the depths of 8 and 23 inches, or between a depth of 8 inches and bedrock, is moist in all parts from November 1 to August 15 and is dry in some part from September 1 to October 1 in most years. Base saturation ranges from 75 to 90 percent throughout. Reaction is slightly acid or neutral.

The A horizon has color of 10YR 4/2, 5/2, or 5/3. Moist color is 10YR 2/2, 3/2, or 3/3. The content of clay ranges from 20 to 27 percent. The content of gravel ranges from 15 to 25 percent.

The Bt horizon has color of 10YR 6/3, 6/4, 7/3, or 7/4. Moist color is 10YR 4/4, 5/3, 5/4, or 5/6. The texture is gravelly loam, very gravelly loam, gravelly clay loam, or very gravelly clay loam. The content of clay ranges from 25 to 35 percent. The content of gravel ranges from 15 to 50 percent and increases with depth.

Vandamme Series

The Vandamme series consists of well drained soils that are deep to weathered bedrock. These soils formed in material weathered from sandstone or mudstone. They are on marine terraces and the upper side slopes of hills. Slopes range from 2 to 75 percent. The mean annual precipitation is about 55 inches, and the mean annual air temperature is about 53 degrees F.

These soils are classified as clayey, mixed, isomesic Typic Haplohumults.

Typical pedon of Vandamme loam, 9 to 30 percent slopes, 500 feet south and 1,200 feet east of the northwest corner of sec. 6, T. 17 N., R. 16 W., MDBM, Comptche Southwest quadrangle:

Oi—1 inch to 0; litter of redwood and tanoak leaves and twigs.

A1—0 to 2 inches; pale brown (10YR 6/3) loam, dark brown (10YR 3/3) moist; strong fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; few very fine and common fine and medium roots; many fine interstitial and few fine tubular pores; moderately acid (pH 5.7); clear smooth boundary.

A2—2 to 4 inches; light yellowish brown (10YR 6/4) loam, dark brown (10YR 3/3) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and common fine and medium roots; many fine interstitial and few fine tubular pores; strongly acid (pH 5.2); clear wavy boundary.

ABt—4 to 9 inches; brownish yellow (10YR 6/6) loam, dark yellowish brown (10YR 4/6) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and medium and few coarse roots; many fine interstitial and few fine tubular pores; very few thin clay films on faces of peds and lining pores; very strongly acid (pH 5.0); gradual wavy boundary.

Bt1—9 to 14 inches; light brown (7.5YR 6/4) clay loam, strong brown (7.5YR 4/6) moist; weak medium and coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic;

common fine and medium roots; common fine interstitial and few fine and medium tubular pores; common thin clay films on faces of peds and lining pores; very strongly acid (pH 5.0); gradual wavy boundary.

Bt2—14 to 20 inches; reddish yellow (7.5YR 6/6) clay, strong brown (7.5YR 4/6) moist; weak medium and coarse subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine and medium roots; common fine interstitial and few fine and medium tubular pores; many thin and common moderately thick clay films on faces of peds and lining pores; very strongly acid (pH 5.0); gradual wavy boundary.

Bt3—20 to 25 inches; strong brown (7.5YR 5/6) clay, strong brown (7.5YR 4/6) moist; weak medium and coarse subangular blocky structure; hard, firm, slightly sticky and plastic; common fine and medium and few coarse roots; common fine interstitial and common fine and medium tubular pores; many thin clay films on faces of peds and common moderately thick clay films on faces of peds and lining pores; strongly acid (pH 5.1); gradual wavy boundary.

Bt4—25 to 42 inches; variegated brownish yellow (10YR 6/8) and strong brown (7.5YR 5/6) clay loam, yellowish brown (10YR 5/8) and strong brown (7.5YR 5/6) moist; weak medium and coarse subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few coarse roots; common fine interstitial and fine and medium tubular pores; many moderately thick clay films on faces of peds and common thick clay films lining pores; very strongly acid (pH 4.9); gradual irregular boundary.

Crt—42 to 59 inches; variegated brownish yellow (10YR 6/8) and strong brown (7.5YR 5/6), soft sandstone, yellowish brown (10YR 5/8) and strong brown (7.5YR 5/6) moist; few very fine roots along fracture planes; many thick and common moderately thick clay films along fracture planes.

The depth to soft bedrock ranges from 40 to 60 inches. The content of organic carbon in the upper 16 inches is 0.9 to 2.0 percent. The mean annual soil temperature ranges from 50 to 56 degrees F. The difference between the mean summer and mean winter soil temperatures ranges from 3 to 6 degrees F. The soil between the depths of 6 and 19 inches is moist in all parts from November 1 to August 1 and is dry in some part from September 1 to October 1 in most years. The content of gravel ranges from 0 to 10 percent throughout.

The A horizon has color of 10YR 6/2, 6/3, 6/4, 6/6, 7/3, or 7/4. Moist color is 10YR 3/2, 3/3, or 4/6. The texture is loam or sandy loam that contains 10 to 27 percent clay. Base saturation ranges from 25 to 45 percent. Reaction is strongly acid or moderately acid.

The Bt horizon has color of 10YR 6/8; 7.5YR 5/6, 6/4, 6/6, 6/8, 7/6, or 7/8; or 5YR 5/6 or 6/6. Moist color is 10YR 5/8; 7.5YR 4/4, 4/6, 5/6, or 5/8; or 5YR 4/8, 5/6, or 5/8. The texture is clay or clay loam. The content of clay ranges from 35 to 50 percent. Base saturation ranges from 5 to 35 percent. Reaction is very strongly acid or strongly acid.

Vizcaino Series

The Vizcaino series consists of well drained soils that are shallow to weathered bedrock. These soils formed in material weathered from sandstone. They are on coastal hills and mountains. Slopes range from 9 to 75 percent. The mean annual precipitation is about 45 inches, and the mean annual air temperature is about 53 degrees F.

These soils are classified as loamy, mixed, isomesic, shallow Udic Argiustolls.

Typical pedon of Vizcaino loam, in an area of Abalobadiah-Bruhel-Vizcaino complex, 50 to 75 percent slopes; 800 feet south and 1,700 feet west of the northeast corner of sec. 20, T. 20 N., R. 17 W., MDBM, Inglenook quadrangle:

A—0 to 2 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak very fine subangular blocky structure parting to weak very fine and fine granular; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; many very fine interstitial and common very fine tubular pores; 2 percent soft and hard angular and subangular gravel (2 to 20 millimeters); moderately acid (pH 6.0); abrupt smooth boundary.

Bt1—2 to 13 inches; dark grayish brown (10YR 4/2) sandy clay loam, very dark brown (10YR 2/2) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and few fine roots; few very fine interstitial and common very fine and fine tubular pores; 2 percent soft and hard angular and subangular gravel (2 to 40 millimeters); few thin clay films on faces of peds and lining pores; moderately acid (pH 5.8); clear wavy boundary.

Bt2—13 to 17 inches; dark grayish brown (10YR 4/2) gravelly clay loam, very dark grayish brown (10YR 3/2) moist; moderate very fine and fine

subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; common very fine roots; common very fine interstitial and tubular and few fine tubular pores; few thin clay films on faces of peds and lining pores; 30 percent soft and hard angular and subangular gravel (2 to 40 millimeters); moderately acid (pH 5.8); abrupt irregular boundary.

Crt—17 to 40 inches; folded and fractured, soft sandstone and moderately hard, fractured sandstone; fractures are less than 1 millimeter wide and are 5 to 30 millimeters apart; few fine roots along primary fractures; thin and moderately thick clay films on fracture faces.

The depth to soft bedrock ranges from 12 to 20 inches. The mollic epipedon is 12 to 20 inches thick and has 1 to 7 percent organic matter. The mean annual soil temperature ranges from 56 to 59 degrees F. The difference between the mean summer and mean winter soil temperatures ranges from 5 to 9 degrees F. The soil between the depths of 5 and 17 inches, or between a depth of 4 inches and bedrock, is moist in all parts from November 1 to June 1 and is dry in all parts from July 1 to October 1 in most years. Base saturation ranges from 50 to 75 percent throughout. Reaction is moderately acid or slightly acid.

The A horizon has color of 10YR 4/1, 4/2, 5/1, 5/2, or 5/3. Moist color is 2/1, 2/2, 3/2, or 3/3. The content of clay ranges from 15 to 27 percent. The content of gravel ranges from 2 to 15 percent.

The Bt horizon has color of 10YR 4/2, 5/2, or 5/3. Moist color is 10YR 2/2, 3/2, or 3/3. The texture is loam, clay loam, sandy clay loam, gravelly loam, or gravelly clay loam. The content of clay ranges from 20 to 35 percent. The content of gravel ranges from 0 to 35 percent. The content of gravel increases with depth.

Windyhollow Series

The Windyhollow series consists of very deep, somewhat poorly drained soils that formed in alluvium derived from mixed rock sources. These soils are on marine terraces and associated side slopes. Slopes range from 0 to 30 percent. The mean annual precipitation is about 40 inches, and the mean annual air temperature is about 53 degrees F.

These soils are classified as fine-loamy, mixed, isomesic Udic Argiustolls.

Typical pedon of Windyhollow loam, 0 to 5 percent slopes, 800 feet north and 2,100 feet east of the southwest corner of sec. 6, T. 13 N., R. 16 W., MDBM, Mallo Pass Creek quadrangle:

A1—0 to 9 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure parting to moderate fine granular; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine interstitial and common very fine tubular pores; 10 percent hard rounded gravel; strongly acid (pH 5.3); clear wavy boundary.

A2—9 to 16 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure parting to moderate fine granular; slightly hard, friable, sticky and plastic; common very fine roots; many very fine interstitial and common very fine tubular pores; 10 percent hard rounded gravel; moderately acid (pH 5.6); clear wavy boundary.

Bt1—16 to 24 inches; light yellowish brown (10YR 6/4) clay loam, dark yellowish brown (10YR 4/4) moist; moderate fine and medium subangular blocky structure; hard, firm, sticky and plastic; few very fine roots; common very fine tubular and interstitial pores; few thin clay films on faces of peds and lining pores; 14 percent hard subangular gravel; moderately acid (pH 5.9); clear wavy boundary.

Bt2—24 to 30 inches; very pale brown (10YR 8/3) gravelly clay loam, yellowish brown (10YR 5/4) moist; few fine distinct brownish yellow (10YR 6/8) mottles, yellowish brown (10YR 5/8) moist; moderate fine and medium subangular blocky structure; hard, firm, sticky and plastic; few very fine roots; many very fine tubular and common very fine interstitial pores; few thin clay films on faces of peds and lining pores; 25 percent hard subangular gravel; moderately acid (pH 5.9); gradual wavy boundary.

Bt3—30 to 43 inches; very pale brown (10YR 8/3) gravelly clay loam, yellowish brown (10YR 5/4) moist; many fine and medium distinct brownish yellow (10YR 6/8) mottles, yellowish brown (10YR 5/8) moist; weak medium subangular blocky structure; slightly hard, firm, slightly sticky and plastic; few very fine roots; common very fine tubular and interstitial pores; few moderately thick clay films on fracture faces and lining pores; 30 percent hard subangular gravel; slightly acid (pH 6.2); clear wavy boundary.

Bt4—43 to 61 inches; white (2.5Y 8/2) clay loam, pale yellow (2.5Y 7/4) moist; common fine and medium distinct brownish yellow (10YR 6/8) mottles, strong brown (7.5YR 5/8) moist; weak

medium subangular blocky structure; hard, firm, slightly sticky and plastic; few very fine roots; few very fine tubular and interstitial pores; few moderately thick clay films on fracture faces; 10 percent hard angular gravel; slightly acid (pH 6.2).

The depth to bedrock is more than 60 inches. The mollic epipedon is 10 to 20 inches thick and has 1 to 7 percent organic matter. The mean annual soil temperature ranges from 50 to 56 degrees F. The difference between the mean summer and mean winter soil temperatures ranges from 6 to 9 degrees F. The soil between the depths of 6 and 19 inches is moist in all parts from November 1 to June 1 and is dry in some or all parts from July 1 to October 1 in most years. The soil is saturated with water for brief or long periods following episodes of heavy rain from December through April. The saturated zone starts between the depths of 30 and 48 inches and extends to a depth of more than 60 inches. The soil is not saturated above a depth of 60 inches from summer through early fall.

The A horizon has color of 10YR 4/1, 4/2, 4/3, 5/2, or 5/3. Moist color is 10YR 2/1, 2/2, 3/1, 3/2, or 3/3. The content of clay ranges from 20 to 27 percent. The content of hard gravel ranges from 5 to 15 percent. Base saturation ranges from 50 to 70 percent. Reaction is strongly acid or moderately acid.

The Bt horizon has color of 2.5Y 7/2 or 8/2 or 10YR 6/3, 6/4, 7/2, 8/2, or 8/3. Moist color is 2.5Y 5/4, 6/4, or 7/4 or 10YR 4/4, 5/3, 5/4, 6/3, or 6/4. Mottles have dry color of 10YR 6/6 or 6/8 and moist color of 10YR 5/6 or 5/8 or 7.5YR 5/8. Matrix colors with chroma of 2 occur with mottles beginning between the depths of 30 and 50 inches and continuing to a depth of 60 inches or more. The Bt horizon is gravelly clay loam, clay loam, or clay. The content of clay ranges from 27 to 45 percent. The content of hard gravel ranges from 5 to 30 percent. Base saturation ranges from 70 to 100 percent. Reaction is moderately acid or slightly acid.

Witherell Series

The Witherell series consists of somewhat excessively drained soils that are shallow to bedrock. These soils formed in material weathered from sandstone. They are on hills and mountains. Slopes range from 9 to 75 percent. The mean annual precipitation is about 50 inches, and the mean annual air temperature is about 57 degrees F.

These soils are classified as loamy, mixed, thermic Lithic Xerochrepts.

Typical pedon of Witherell loam, in an area of Squawrock-Witherell complex, 15 to 50 percent slopes; 500 feet north and 200 feet west of the southeast corner of sec. 11, T. 13 N., R. 14 W., MDBM, Ornbaun Valley Northeast quadrangle:

A—0 to 1 inch; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure parting to moderate fine granular; slightly hard, friable, nonsticky and nonplastic; many very fine and common fine roots; common very fine and fine interstitial pores; 5 percent gravel; strongly acid (pH 5.2); clear wavy boundary.

Bw—1 to 7 inches; light yellowish brown (10YR 6/4) loam, dark brown (10YR 4/3) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; few very fine and common fine roots; few very fine and fine interstitial pores; 5 percent gravel; very strongly acid (pH 4.9); clear wavy boundary.

Bt—7 to 12 inches; light yellowish brown (10YR 6/4) loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and common fine roots; few very fine and fine interstitial pores; few thin clay films bridging mineral grains; many thin silt coatings lining pores; 5 percent gravel; very strongly acid (pH 4.8); clear wavy boundary.

R—12 to 14 inches; gray (10YR 5/1), hard, fractured sandstone; fractures are 0.5 centimeter to 10 centimeters apart and are less than 1 millimeter wide; few very fine roots along fracture faces; many thin silt coatings lining fracture faces.

The depth to hard bedrock ranges from 10 to 20 inches. The mean annual soil temperature ranges from 59 to 62 degrees F. The soil from a depth of 7 inches to bedrock is moist in all parts from November 1 to May 1 and is dry in all parts from June 1 to October 15 in most years. Base saturation ranges from 60 to 90 percent throughout.

The A horizon has color of 10YR 5/3 or 5/4 or 7.5YR 5/6. Moist color is 10YR 3/3 or 4/3 or 7.5YR 4/4. The content of clay ranges from 15 to 27 percent. Reaction is strongly acid or moderately acid.

The B horizon has color of 10YR 6/3, 6/4, or 7/4 or 7.5YR 6/6. Moist color is 10YR 3/3, 4/3, or 4/4 or 7.5YR 4/6. The texture is loam, gravelly loam, or sandy loam. The content of clay ranges from 12 to 27 percent. The content of gravel ranges from 5 to 25 percent. Reaction ranges from very strongly acid to moderately acid.

Wohly Series

The Wohly series consists of well drained soils that are moderately deep to weathered bedrock. These soils formed in material weathered from sandstone. They are on hills and mountains. Slopes range from 9 to 75 percent. The mean annual precipitation is about 60 inches, and the mean annual air temperature is about 55 degrees F.

These soils are classified as fine-loamy, mixed, mesic Ultic Haploxeralfs.

Typical pedon of Wohly loam, in an area of Casabonne-Wohly complex, 30 to 50 percent slopes; 100 feet west of the southeast corner of sec. 3, T. 13 N., R. 15 W., MDBM, Boonville Southwest quadrangle:

Oi—1/2 inch to 0; litter of tanoak, live oak, and madrone.

A—0 to 4 inches; pale brown (10YR 6/3) loam, dark yellowish brown (10YR 4/4) moist; weak medium and moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; common very fine and fine roots; common fine interstitial and tubular pores; slightly acid (pH 6.2); clear smooth boundary.

Bt1—4 to 10 inches; variegated light yellowish brown (10YR 6/4) and strong brown (7.5YR 5/6) loam, dark brown (7.5YR 4/4) moist; moderate fine and medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine and fine and few coarse roots; common fine interstitial and few medium tubular pores; few thin clay films lining pores; 5 percent gravel; moderately acid (pH 5.8); clear wavy boundary.

Bt2—10 to 26 inches; variegated very pale brown (10YR 7/4) and reddish yellow (7.5YR 6/6) clay loam, strong brown (7.5YR 5/6) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; few very fine and coarse and common fine roots; common fine interstitial and few fine tubular pores; common moderately thick clay films on faces of peds and lining pores; 5 percent gravel; 4-inch krotovina; strongly acid (pH 5.3); clear wavy boundary.

Bt3—26 to 31 inches; very pale brown (10YR 7/4) gravelly clay loam, strong brown (7.5YR 5/6) moist; moderate medium subangular blocky structure; very hard, firm, slightly sticky and slightly plastic; common fine and few coarse roots; few fine interstitial and tubular pores; common moderately thick clay films on faces of peds and lining pores; 15 percent gravel; strongly acid (pH 5.4); abrupt irregular boundary.

Crt—31 to 45 inches; soft, fractured sandstone; fractures are less than 1 millimeter wide and are 5 to 75 millimeters apart; few fine roots along fracture faces; common moderately thick clay films on fracture faces.

The depth to soft bedrock ranges from 20 to 40 inches. The mean annual soil temperature ranges from 54 to 59 degrees F. The soil between the depths of 6 and 17 inches is moist in all parts from November 1 to May 15 and is dry in all parts from July 1 to October 1 in most years.

The A horizon has color of 10YR 5/3, 5/4, or 6/3 or 7.5YR 6/4. Moist color is 10YR 3/4, 4/3, or 4/4. The content of clay ranges from 15 to 25 percent. The content of gravel ranges from 0 to 15 percent. Reaction ranges from moderately acid to neutral.

The Bt horizon has color of 10YR 6/4 or 7/4, 7.5YR 5/6 or 6/6, or 5YR 6/4 or 6/8. Moist color is 10YR 4/4; 7.5YR 4/4, 5/6, or 6/6; or 5YR 4/4. The texture is loam, clay loam, or gravelly clay loam. The content of clay ranges from 25 to 35 percent. The content of gravel ranges from 5 to 35 percent. Base saturation ranges from 40 to 85 percent. Reaction ranges from strongly acid to neutral.

Wolfey Series

The Wolfey series consists of well drained soils that are shallow to weathered bedrock. These soils formed in material weathered from sandstone. They are on hills and mountains. Slopes range from 5 to 75 percent. The mean annual precipitation is about 55 inches, and the mean annual air temperature is about 57 degrees F.

These soils are classified as loamy, mixed, thermic, shallow Typic Xerochrepts.

Typical pedon of Wolfey loam, in an area of Wolfey-Bearwallow complex, 50 to 75 percent slopes; 2,100 feet north and 1,900 feet west of the southeast corner of sec. 10, T. 14 N., R. 14 W., MDBM, Boonville Southwest quadrangle:

A—0 to 3 inches; light yellowish brown (10YR 6/4) loam, dark yellowish brown (10YR 4/4) moist; weak very fine and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and few fine roots; few very fine and fine tubular and many very fine interstitial pores; neutral (pH 6.8); clear wavy boundary.

Bw1—3 to 10 inches; light yellowish brown (10YR 6/4) loam, dark yellowish brown (10YR 4/4) moist; moderate medium and coarse subangular blocky structure; hard, friable, slightly sticky and

slightly plastic; few very fine roots; common very fine tubular and interstitial and few fine tubular pores; slightly acid (pH 6.2); clear wavy boundary.

Bw2—10 to 15 inches; light yellowish brown (10YR 6/4) loam, dark yellowish brown (10YR 4/4) moist; weak fine and medium subangular blocky structure; hard, very friable, slightly sticky and slightly plastic; few very fine roots; few fine and common very fine tubular pores and many very fine interstitial pores; slightly acid (pH 6.2); abrupt wavy boundary.

Cr—15 to 20 inches; soft, fractured, coarse grained sandstone; fractures are less than 1 millimeter wide and are 20 to 50 millimeters apart; few very fine roots along fracture faces.

The depth to soft bedrock ranges from 10 to 20 inches. The mean annual soil temperature ranges from 59 to 62 degrees F. The soil between a depth of 7 inches and bedrock is moist in all parts from November 1 to May 1 and is dry in all parts from June 1 to October 15 in most years. Base saturation ranges from 60 to 85 percent.

The A horizon has color of 10YR 5/3, 5/4, 6/3, 6/4, or 7/3. Moist color is 10YR 3/3, 3/4, 4/3, 4/4, or 6/4. The content of clay ranges from 12 to 20 percent. Reaction is slightly acid or neutral.

The Bw horizon has color of 10YR 5/3, 5/4, 6/3, 6/4, or 7/3. Moist color is 10YR 3/4, 4/3, 4/4, 5/3, or 7/3. There is a slight increase in clay content compared to that in the A horizon, but this increase is not enough to meet the requirements for an argillic horizon. Reaction is moderately acid or slightly acid.

Woodin Series

The Woodin series consists of well drained soils that are moderately deep to bedrock. These soils formed in material weathered from sandstone. They are on hills and mountains. Slopes range from 9 to 75 percent. The mean annual precipitation is about 60 inches, and the mean annual air temperature is about 55 degrees F.

These soils are classified as loamy-skeletal, mixed, mesic Dystric Xerochrepts.

Typical pedon of Woodin extremely gravelly sandy loam, in an area of Woodin-Yellowhound complex, 50 to 75 percent slopes; 2,650 feet south and 20 feet west of the northeast corner of sec. 35, T. 12 N., R. 15 W., MDBM, Ornbaun Valley Southwest quadrangle:

A1—0 to 2 inches; very dark brown (10YR 2/2) extremely gravelly sandy loam, black (10YR 2/1) moist; moderate very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; many very fine and fine interstitial pores; 95 percent gravel; strongly acid (pH 5.4); abrupt smooth boundary.

A2—2 to 6 inches; very dark brown (10YR 2/2) extremely gravelly sandy loam, black (10YR 2/1) moist; strong very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; many very fine and fine interstitial pores; 6 percent angular gravel; strongly acid (pH 5.4); clear smooth boundary.

Bw1—6 to 13 inches; very pale brown (10YR 7/4) extremely gravelly loam, dark yellowish brown (10YR 4/4) moist; strong very fine and fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine and common medium and coarse roots; many very fine, fine, and medium interstitial pores; few silt coatings on faces of peds; 60 percent gravel; 5 percent cobbles; very strongly acid (pH 4.9); clear wavy boundary.

Bw2—13 to 22 inches; very pale brown (10YR 7/3) extremely gravelly loam, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure; hard, firm, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; many fine and medium interstitial pores; few thin silt coatings on faces of peds; 60 percent gravel, 10 percent cobbles, 2 percent stones; strongly acid (pH 5.3); abrupt irregular boundary.

R—22 inches; hard, fractured sandstone; fractures are less than 1 millimeter wide and are 6 to 30 centimeters apart; few very fine roots along fractures; few thin silt coatings on fracture faces.

The depth to hard bedrock ranges from 20 to 40 inches. The mean annual soil temperature ranges from 54 to 59 degrees F. The soil between the depths of 10 and 31 inches, or between a depth of 10 inches and bedrock, is dry in all parts from July 1 to October 1 and is moist in all parts from November 1 to May 15 in most years. Reaction ranges from very strongly acid to moderately acid throughout.

The A horizon has color of 10YR 2/2, 3/2, 4/3, 5/3, or 5/4. Moist color is 10YR 2/1, 2/2, 3/2, or 3/3. The texture is gravelly sandy loam or extremely gravelly sandy loam. The content of clay ranges from 15 to 25 percent. The content of gravel ranges from 35 to 95 percent. The content of cobbles ranges from 0 to 10 percent. Base saturation ranges from 50 to 80 percent.

The Bw horizon has color of 10YR 6/4, 7/3, or 7/4

or 7.5YR 6/4 or 7/4. Moist color is 10YR 3/3, 4/3, or 4/4 or 7.5YR 4/4. The texture is very gravelly loam, very gravelly sandy loam, very gravelly sandy clay loam, extremely gravelly loam, or extremely gravelly sandy loam. The content of clay ranges from 15 to 25 percent. The content of gravel ranges from 35 to 70 percent. The content of cobbles ranges from 5 to 10 percent. The content of stones ranges from 0 to 5 percent. Base saturation ranges from 20 to 55 percent.

Xerochrepts

Xerochrepts are very deep, well drained soils on dissected river terraces and terrace escarpments. These soils formed in alluvium derived from mixed rock sources. Slopes range from 9 to 50 percent. The mean annual precipitation is about 50 inches, and the mean annual air temperature is about 55 degrees F.

Reference pedon of Xerochrepts, in an area of Xerochrepts-Haploxeralfs-Argixerolls complex, 30 to 50 percent slopes; 250 feet north and 1,300 feet east of the southwest corner of sec. 27, T. 22 N., R. 15 W., MDBM, Cahto Peak quadrangle:

Oi—1/2 inch to 0; litter of partially decomposing pine and Douglas-fir leaves and twigs.

A—0 to 8 inches; yellowish brown (10YR 5/4) gravelly loam, dark brown (7.5YR 3/4) moist; weak very fine and fine granular structure; soft, friable, slightly sticky and slightly plastic; many very fine, fine, and medium roots; many very fine, medium, and coarse interstitial pores; 20 percent hard subangular gravel; neutral (pH 7.0); clear smooth boundary.

Bw—8 to 25 inches; brownish yellow (10YR 6/6) gravelly loam, strong brown (7.5YR 4/6) moist; weak very fine and fine subangular blocky structure; soft, friable, slightly sticky and slightly plastic; many very fine, fine, medium, and coarse roots; many very fine and fine tubular pores and many very fine, fine, medium, and coarse interstitial pores; 30 percent hard subangular gravel; slightly acid (pH 6.5); gradual wavy boundary.

C1—25 to 35 inches; light yellowish brown (10YR 6/4) very gravelly loam, dark brown (7.5YR 4/4) moist; weak very fine and fine subangular blocky structure; soft, friable, slightly sticky and slightly plastic; common very fine and fine and many medium and coarse roots; many very fine, fine, and medium tubular and interstitial pores; 25 percent hard subangular gravel; 10 percent hard angular cobbles; moderately acid (pH 6.0); gradual wavy boundary.

2C2—35 to 45 inches; light yellowish brown (10YR 6/4) very gravelly sandy loam, dark brown (7.5YR 4/4) moist; weak very fine and fine subangular blocky structure; soft, friable, slightly sticky and slightly plastic; few very fine and fine and common medium and coarse roots; many very fine and fine tubular and interstitial pores; 35 percent hard subangular gravel; moderately acid (pH 6.0); gradual wavy boundary.

3C3—45 to 61 inches; light yellowish brown (10YR 6/4) very gravelly loam, dark brown (7.5YR 4/4) moist; weak very fine subangular blocky structure; soft, friable, slightly sticky and slightly plastic; few fine and very fine and common medium and coarse roots; common very fine, fine, medium, and coarse tubular and interstitial pores; 35 percent hard subangular gravel; 5 percent hard subangular cobbles; moderately acid (pH 5.8).

The depth to bedrock is more than 60 inches. The mean annual soil temperature ranges from 55 to 59 degrees F. The soil between the depths of 7 and 26 inches is moist in all parts from November 1 through June 1 and is dry in all parts from July 1 through October 1 in most years. Base saturation ranges from 30 to 90 percent throughout. Reaction ranges from moderately acid to neutral.

The A horizon has color of 10YR 5/3, 5/4, 6/3, or 6/4. Moist color is 10YR 3/3, 3/4, 4/4, or 5/4 or 7.5YR 3/2 or 3/4. The content of clay ranges from 15 to 27 percent. The content of gravel ranges from 5 to 30 percent.

The Bw horizon has color of 10YR 5/6, 6/3, 6/4, or 6/6. Moist color is 10YR 4/4, 4/6, or 5/6 or 7.5YR 3/4, 4/4, or 4/6. The texture is gravelly loam, gravelly sandy loam, very gravelly loam, very gravelly sandy loam, or gravelly clay loam. The content of clay ranges from 15 to 40 percent. The content of gravel also ranges from 15 to 40 percent. The content of cobbles ranges from 0 to 15 percent. The total content of rock fragments ranges from 15 to 55 percent.

The C horizon has color of 10YR 5/6, 6/3, 6/4, or 6/6. Moist color is 10YR 4/4, 4/6, or 5/6 or 7.5YR 3/4, 4/4, or 4/6. The texture is very gravelly loam, very gravelly sandy loam, very cobbly loam, or very cobbly sandy loam. The total content of rock fragments ranges from 35 to 50 percent. The content of gravel ranges from 0 to 40 percent, and the content of cobbles ranges from 0 to 50 percent.

Yellowhound Series

The Yellowhound series (fig. 8) consists of well drained soils that are deep to bedrock. These soils formed in material weathered from sandstone. They are on hills and mountains. Slopes range from 9 to 99 percent. The mean annual precipitation is about 60 inches, and the mean annual air temperature is about 53 degrees F.

These soils are classified as loamy-skeletal, mixed, isomesic Ultic Haplustalfs.

Typical pedon of Yellowhound gravelly loam, in an area of Yellowhound-Kibesillah complex, 50 to 75 percent slopes; 2,000 feet south and 400 feet west of the northeast corner of sec. 29, T. 21 N., R. 16 W., MDBM, Lincoln Ridge quadrangle:

Oi—1 inch to 0; litter of Douglas-fir, tanoak, and huckleberry.

A—0 to 6 inches; variegated pale brown (10YR 6/3) and very pale brown (10YR 7/3) gravelly loam, brown (10YR 4/3) moist; moderate fine and medium subangular blocky structure; slightly hard, very friable, nonsticky and slightly plastic; common very fine and fine and few medium roots; common fine tubular and very fine and fine interstitial pores; 15 percent pebbles; moderately acid (pH 5.6); gradual wavy boundary.

AB—6 to 15 inches; variegated light yellowish brown (10YR 6/4) and very pale brown (10YR 7/3) gravelly loam, yellowish brown (10YR 5/4) moist; moderate medium subangular blocky structure; hard, very friable, nonsticky and slightly plastic; common very fine, fine, and medium roots; many very fine and fine interstitial and common fine tubular pores; 25 percent gravel; moderately acid (pH 5.7); gradual wavy boundary.

Bt1—15 to 28 inches; variegated light yellowish brown (10YR 6/4) and very pale brown (10YR 7/3) extremely gravelly loam, yellowish brown (10YR 5/4 and 5/6) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine and medium and few very fine and coarse roots; many very fine and fine interstitial and common medium tubular pores; common moderately thick clay films on faces of peds and lining pores; 65 percent gravel; 5 percent cobbles (75 to 125 millimeters); moderately acid (pH 5.7); gradual wavy boundary.

Bt2—28 to 45 inches; variegated pale brown (10YR 6/3), light yellowish brown (10YR 6/4), and very pale brown (10YR 7/3) extremely gravelly loam, yellowish brown (10YR 5/6 and 5/4) moist; weak medium subangular blocky structure; hard, friable, nonsticky and slightly plastic; common fine, medium, and coarse roots; many very fine and fine interstitial and few fine tubular pores; common moderately thick clay films on faces of peds and lining pores; 60 percent gravel; 2 percent cobbles; moderately acid (pH 5.9); gradual wavy boundary.

Figure 8.—A profile of Yellowhound gravelly loam. This deep soil is extensive in the survey area. It is used for the production of timber. Depth is marked in feet.

BCt—45 to 53 inches; yellowish brown (10YR 5/4) extremely gravelly loam, yellowish brown (10YR 5/6 and 5/8) moist; weak fine angular blocky structure; hard, friable, nonsticky and slightly plastic; few fine roots; many very fine and fine interstitial pores; many moderately thick clay films on faces of peds and lining pores; 65 percent gravel; moderately acid (pH 6.0); abrupt wavy boundary.

R—53 inches; hard, fractured sandstone; fractures

are 2 to 10 centimeters apart and 1 to 5 millimeters wide.

The depth to hard bedrock ranges from 40 to 60 inches. The mean annual soil temperature ranges from 50 to 56 degrees F. The difference between the mean winter and mean summer soil temperatures ranges from 5 to 9 degrees F. The soil between the depths of 7 and 28 inches is moist in all parts from November 1 to June 1 and is dry in some or all parts from July 1 to October 1 in most years. Reaction ranges from strongly acid to slightly acid throughout.

The A horizon has color of 10YR 4/2, 4/3, 4/4, 5/2, 5/3, 5/4, 6/3, 6/4, 7/2, or 7/3. Moist color is 10YR 2/1, 2/2, 3/2, 3/3, 3/4, 4/2, 4/3, 4/4, 5/3, or 5/4. The texture is gravelly loam or loam. The content of clay ranges from 10 to 20 percent. The content of gravel ranges from 10 to 25 percent.

The Bt horizon has color of 10YR 4/3, 4/4, 5/2, 5/3, 5/4, 6/2, 6/3, 6/4, 6/6, 7/3, 7/4, or 7/6 or 7.5YR 4/4 or 6/4. Moist color is 10YR 3/4, 4/3, 4/4, 5/3, 5/4, 5/6, 5/8, 6/3, 6/4, or 6/8 or 7.5YR 4/4 or 5/4. The texture is very gravelly or extremely gravelly loam, very gravelly or extremely gravelly clay loam, or very gravelly or extremely gravelly sandy clay loam. The content of clay ranges from 15 to 30 percent. The content of gravel ranges from 35 to 80 percent. The content of cobbles ranges from 0 to 10 percent. Base saturation ranges from 50 to 75 percent.

Yorktree Series

The Yorktree series consists of well drained soils that are deep to bedrock. These soils formed in material weathered from sandstone. They are on hills and mountains. Slopes range from 15 to 50 percent. The mean annual precipitation is about 60 inches, and the mean annual air temperature is about 56 degrees F.

These soils are classified as fine, mixed, mesic Ultic Argixerolls.

Typical pedon of Yorktree loam, in an area of Yorkville-Yorktree-Squawrock complex, 15 to 30 percent slopes; 1,250 feet south and 500 feet east of the northwest corner of sec. 26, T. 14 N., R. 14 W., MDBM, Boonville Southwest quadrangle:

Oi—1 inch to 0; litter of live oak.

A—0 to 11 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; moderate fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common medium and coarse and few fine roots; common fine and medium interstitial and few medium tubular pores; 10 percent gravel; neutral (pH 7.0); clear wavy boundary.

Bt1—11 to 24 inches; grayish brown (2.5Y 5/2) gravelly clay loam, very dark grayish brown (10YR 3/2) moist; weak coarse subangular blocky structure; very hard, very firm, sticky and very plastic; few fine and medium roots; few fine and medium tubular pores; many moderately thick clay films on faces of peds and lining pores; 15 percent gravel; 10 percent cobbles; slightly acid (pH 6.3); clear wavy boundary.

Bt2—24 to 38 inches; light olive brown (2.5Y 5/4) gravelly clay loam, dark brown (10YR 3/3) moist; weak coarse subangular blocky structure; very hard, very firm, sticky and very plastic; few medium roots; few very fine and fine tubular pores; many moderately thick clay films on faces of peds and lining pores; 15 percent gravel; 5 percent cobbles; slightly acid (pH 6.3); gradual wavy boundary.

Bt3—38 to 46 inches; light olive brown (2.5Y 5/4) gravelly clay loam, dark brown (10YR 3/3) moist; weak medium and coarse subangular blocky structure; very hard, firm, sticky and plastic; common very fine and fine interstitial and few very fine tubular pores; common thin clay films on faces of peds and lining pores; 20 percent gravel; slightly acid (pH 6.3); clear wavy boundary.

C—46 to 58 inches; variegated yellowish brown (10YR 5/4) and pale brown (10YR 6/3) gravelly clay loam, dark yellowish brown (10YR 4/4) moist; massive; very hard, firm, slightly sticky and slightly plastic; common very fine and fine interstitial pores; 30 percent gravel; slightly acid (pH 6.3); abrupt irregular boundary.

R—58 to 61 inches; hard, fractured sandstone; fractures are 10 to 50 millimeters apart and 1 to 5 millimeters wide.

The depth to hard bedrock ranges from 40 to 60 inches. The mollic epipedon is 10 to 18 inches thick and has 1 to 3 percent organic matter. The mean annual soil temperature ranges from 55 to 59 degrees F. The soil between the depths of 7 and 20 inches is moist in all parts from November 1 to May 15 and is dry in all parts from July 1 to October 1 in most years. Reaction ranges from moderately acid to neutral throughout.

The A horizon has color of 10YR 4/2 or 4/3. Moist color is 10YR 2/2 or 3/2. The content of clay ranges from 20 to 27 percent. The content of gravel ranges from 2 to 15 percent. Base saturation ranges from 60 to 75 percent.

The Bt horizon has color of 10YR 5/3 or 5/4 or 2.5Y 5/2 or 5/4. Moist color is 10YR 3/2, 3/3, 4/2, or 4/3. The texture is clay loam, clay, gravelly clay loam, or gravelly clay. The content of clay ranges from 35 to 50 percent. The content of rock fragments ranges from 5 to 35 percent. Base saturation ranges from 60 to 90 percent.

The C horizon has color of 10YR 5/4 or 6/3 or 7.5YR 5/4. Moist color is 10YR 4/4 or 7.5YR 4/4. The content of clay ranges from 35 to 40 percent. The content of rock fragments ranges from 15 to 35 percent.

Yorkville Series

The Yorkville series consists of moderately well drained soils that are deep or very deep to weathered bedrock. These soils formed in material weathered from schist. They are on hills and mountains. Slopes range from 9 to 50 percent. The mean annual precipitation is about 60 inches, and the mean annual air temperature is about 57 degrees F.

These soils are classified as fine, mixed, thermic Typic Argixerolls.

Typical pedon of Yorkville clay loam, in an area of Yorkville-Yorktree-Squawrock complex, 15 to 30 percent slopes; 1,900 feet south of the northwest corner of sec. 26, T. 14 N., R. 14 W., MDBM, Boonville Southwest quadrangle:

A1—0 to 4 inches; very dark grayish brown (10YR 3/2) clay loam, very dark gray (10YR 3/1) moist; strong fine and medium subangular blocky structure; very hard, very firm, sticky and plastic; common very fine roots; few very fine tubular pores; moderately acid (pH 6.0); clear wavy boundary.

A2—4 to 12 inches; very dark grayish brown (10YR 3/2) clay loam, very dark gray (10YR 3/1) moist; strong medium and coarse angular blocky structure; very hard, very firm, sticky and plastic; common very fine roots; few very fine tubular pores; neutral (pH 7.0); clear wavy boundary.

Bt1—12 to 17 inches; very dark grayish brown (10YR 3/2) clay, very dark gray (10YR 3/1) moist; moderate medium and coarse angular blocky structure; very hard, very firm, sticky and plastic; few very fine and fine roots; few very fine and fine tubular pores; common pressure faces; few thin clay films on faces of peds; moderately alkaline (pH 8.0); gradual wavy boundary.

Bt2—17 to 29 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; few fine distinct reddish yellow (7.5YR 6/6) mottles; weak coarse angular blocky structure; extremely hard, extremely firm, sticky and very plastic; few fine and medium roots; few fine and medium tubular pores; many pressure faces; few thin clay films on faces of peds; moderately alkaline (pH 8.0); gradual wavy boundary.

Bt3—29 to 62 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; common fine distinct reddish yellow (7.5YR 6/6) mottles; weak coarse angular blocky structure; extremely hard, extremely firm, sticky and very plastic; few fine and medium tubular pores; common pressure faces; few thin clay films on faces of peds; some secondary lime accumulations; moderately alkaline (pH 8.0).

The depth to hard bedrock ranges from 40 to 80 inches. The mollic epipedon is 10 to 17 inches thick and has 1 to 4 percent organic matter. The mean annual soil temperature ranges from 59 to 64 degrees F. The soil between the depths of 6 and 17 inches is moist in all parts from November 1 to May 15 and is dry in all parts from July 1 to October 1 in most years.

The A horizon has color of 10YR 3/2, 3/3, or 4/2. Moist color is 10YR 3/1 or 3/2. The content of clay ranges from 27 to 32 percent. Base saturation ranges from 75 to 95 percent. Reaction ranges from moderately acid to neutral.

The Bt horizon has color of 10YR 3/2, 4/2, or 4/3 or 2.5Y 4/2 or 5/2. Moist color is 10YR 3/1 or 3/2 or 2.5Y 3/2 or 4/2. The texture is clay loam or clay. The content of clay ranges from 35 to 50 percent. Base saturation ranges from 80 to 100 percent. Reaction ranges from neutral to moderately alkaline.

Zeni Series

The Zeni series consists of well drained soils that are moderately deep to weathered bedrock. These soils formed in material weathered from sandstone or mudstone. They are on hills and mountains. Slopes range from 9 to 75 percent. The mean annual precipitation is about 60 inches, and the mean annual air temperature is about 53 degrees F.

These soils are classified as fine-loamy, mixed, isomesic Ultic Haplustalfs.

Typical pedon of Zeni loam, in an area of Ornbaun-Zeni complex, 9 to 30 percent slopes; 2,200 feet south and 1,350 feet east of the northwest corner of sec. 10, T. 13 N., R. 14 W., MDBM, Boonville Southwest quadrangle:

Oi—1 inch to 0; partially decomposed litter of redwood, Douglas-fir, and tanoak.

A—0 to 4 inches; pale brown (10YR 6/3) loam, dark brown (10YR 3/3) moist; moderate medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine and few medium and coarse roots; many very fine tubular and interstitial pores; 2 percent soft subangular gravel; moderately acid (pH 5.7); clear wavy boundary.

BAt—4 to 16 inches; light brown (7.5YR 6/4) loam, brown (7.5YR 4/4) moist; moderate fine angular blocky structure; hard, firm, sticky and plastic; common fine and few medium and coarse roots; common very fine and fine tubular and interstitial pores; few thin clay films lining pores and on faces of peds; 1 percent nodules; moderately acid (pH 5.7); clear wavy boundary.

Bt—16 to 30 inches; yellow (10YR 7/6) loam, yellowish brown (10YR 5/6) moist; moderate fine and weak medium angular blocky structure; hard, firm, sticky and plastic; common coarse and few fine and medium roots; many very fine tubular and interstitial pores; many thin clay films and grainy coatings lining pores and on faces of peds; 10 percent soft subangular gravel; strongly acid (pH 5.4); abrupt irregular boundary.

Crt—30 to 45 inches; yellow (10YR 7/6), fractured, highly weathered sandstone, yellowish brown (10YR 5/8) moist; fractures are 2 to 25 centimeters apart; few fine roots along fractures; continuous thick clay films on fracture faces.

The depth to soft bedrock ranges from 20 to 40 inches. The mean annual soil temperature ranges from 50 to 56 degrees F. The difference between the mean summer and mean winter soil temperatures ranges from 5 to 9 degrees F. The soil between the depths of 6 and 17 inches is moist in all parts from November 1 to June 1 and is dry in some or all parts from July 1 to October 1 in most years. Base saturation ranges from 40 to 75 percent throughout.

The A horizon has color of 10YR 4/3, 5/2, 6/2, 6/3, or 6/4. Moist color is 10YR 2/2, 3/3, 3/4, 4/3, or 4/4. The content of clay ranges from 15 to 25 percent. The content of soft gravel ranges from 0 to 10 percent. Reaction ranges from strongly acid to slightly acid.

The Bt horizon has color of 10YR 6/6 or 7/6 or 7.5YR 6/4, 6/6, 7/4, or 7/6. Moist color is 10YR 5/6 or 7.5YR 3/4, 4/4, 5/6, 6/4, 6/6, or 7/6. The texture is loam, clay loam, or sandy clay loam. The content of clay ranges from 20 to 30 percent. The content of soft gravel ranges from 0 to 15 percent. Reaction is strongly acid or moderately acid.

Formation of the Soils

This section describes the processes of soil formation and relates them to the formation of the soils in the survey area.

Soil is a dynamic, natural body on the surface of the earth in which plants grow. It forms in response to the forces of climate and organisms, which act on the parent material on a specific landscape over a period of time.

Soil formation is an ongoing process. Changes in the soil typically occur so slowly that they are unnoticeable over the span of a human lifetime. For example, today's dark brown, loamy coastal grassland soil was once a pale brown, sandy soil on a stabilized sand dune. After thousands of years of soil formation, the soil was transformed into its present state. Over time, the soil will continue to evolve into another unique soil.

Soil formation is the result of many kinds of processes, ranging from relatively simple rearrangements of matter to complicated chemical reactions. Soil-forming processes can be broadly grouped into four categories: additions, losses, translocations, and transformations. Several of these processes may occur simultaneously, and one process may influence the outcome of another.

Additions include organic matter, mineral materials, and water that soils receive. Organic matter is added as plant life dies and accumulates on the soil surface. Mineral material is added by eroding soil from upslope areas or by sediments deposited during flooding. Water is added to soils through rainfall, run-on, and flooding.

Losses from the soil body are primarily a result of leaching (fig. 9). Water percolating through the soil dissolves minerals and carries them out of the soil. Carbonates and many salts are easily leached from the soil. Minerals, such as iron oxides and quartz, dissolve very slowly and are not easily leached from the soil. Soils may also lose mineral materials through erosion.

Translocation is the movement of materials from one point to another within the soil body. Movement is generally from a horizon near the soil surface into a horizon deeper in the soil profile. Very fine clay minerals move downward with percolating water from the surface layer to the subsoil, where they may accumulate. Certain materials, such as iron and aluminum compounds, may be moved downward through the soil profile and accumulate at some point, creating an impermeable layer or pan.

Transformations are changes that occur in place within the soil. Organic matter is changed to humus by micro-organisms in the soil. Minerals may be transformed through chemical and physical weathering. The formation of clay minerals from other minerals present in the parent rock is also a transformation process.

The soil-forming processes that occur in any given soil and the resulting soil properties are determined by five soil-forming factors. These factors are the climate, including the temperature and the amount of precipitation, that has existed as the soil has accumulated or weathered; organisms, or the plants and animals living in and on the soil; topography as it affects drainage, aeration, and susceptibility to water erosion and wind erosion; parent material, including its physical properties and chemical composition; and time, or the duration of soil formation. The interaction among all of these factors determines the formation of every soil. The relative importance of individual factors varies from place to place, and the factors commonly interact and modify each other. Soil scientists use their knowledge of the interactions between parent material, topography, climate, vegetation, and the age of the soil to help them predict the occurrence of a soil type.

The following paragraphs describe the five soil-forming factors and their effects on the soils in the survey area.

Topography

Topography, along with parent material, defines the initial state of a soil system before soil formation starts. Topographic features pertinent to soil formation include steepness and length of slope, shape of slope (concave, convex, planar), landscape position (ridgetop, side slope, toeslope, flood plain), and aspect.

Additions and losses of soil material and water to

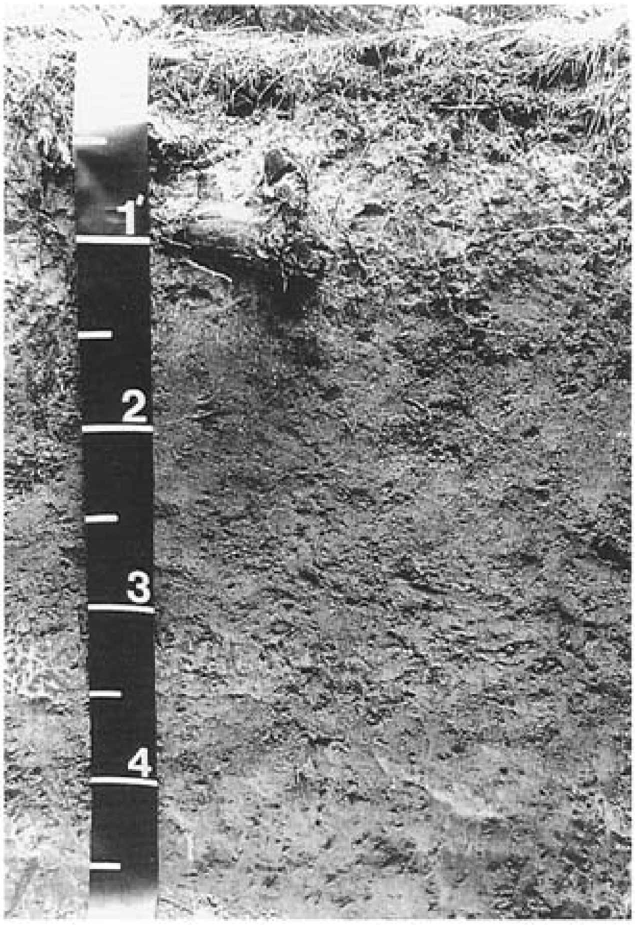

Figure 9.—A profile of Ferncreek sandy loam. This very deep soil has a distinctive light gray surface layer. The light color indicates a nearly complete removal of iron compounds and organic matter as a result of intense leaching. Albic horizons have formed in soils on the stable surface of the marine terrace system. Depth is marked in feet.

a soil body are influenced by its position on a slope and by the shape and steepness of the slope. For example, a soil on a steep, convex ridgetop may experience a net loss of soil material through erosion, resulting in reduced soil depth. Rainwater drains rapidly from such a soil, locally causing droughty soil conditions. Low soil moisture results in a slowing of weathering and soil-forming processes in the soil. The very shallow Snook soils are examples of somewhat excessively drained soils that have suffered significant erosional losses because of topographic position. These soils show little or no horizonation or other profile development. Soils on gently sloping, concave toeslopes tend to accumulate soil material and receive additions of water from areas upslope. Such soils tend to be deeper and more developed than soils on ridgetops.

In the eastern part of the survey area, outside the zone of marine influence, aspect plays an important part in determining soil moisture content and the depletion of summer soil moisture is significant. Soils that have a northerly aspect receive less sunlight and thus lose less soil moisture to evapotranspiration than soils that have a southerly aspect. Weathering and development proceed at a faster rate under the locally moist conditions, resulting in more deeply developed soils. Commonly, the cooler (mesic) Hopland soils are on the north-facing side of a hill under an oak canopy, and the warmer (thermic) soils, such as Wolfey soils, are on the south-facing slope under grass vegetation. The Hopland soils are moderately deep and have an argillic horizon. The Wolfey soils are shallow and do not have an argillic horizon.

In the western part of the survey area, where summer moisture stress is not so pronounced because of the cool, moist marine air, the effect of aspect on soil development is less noticeable. The mountains of the Coast Range prevent the movement of summer marine fogs into the interior part of the survey area, except for fingering through drainageways. Generally, significant marine influence does not occur above elevations of about 2,000 feet.

Shape of a slope, as well as landscape position, can dictate the concentration of runoff and subsurface flow of water. This effect is expressed in some areas of the marine terrace system (fig. 10), where surface runoff from the upper terraces is received by soils on the lower terraces. Subsurface flow carried in sediments above the underlying sandstone terrace platform also finds an outlet on the lower terraces. The water may be further concentrated by the unevenness in shape of the terrace surface or by irregularities in shape of the underlying hard rock platform. Soils such as Tropaquepts and the Cabrillo soils, which receive concentrated run-on or subsurface water, exhibit strong mottling or gleying as a result of prolonged saturation. Proximity to drainage outlets for excess water can determine the moisture conditions of a soil system during soil formation.

The shoulders of the marine terraces border the deeply cut gulches that drain the terrace system. Soils in these landscape positions, such as Caspar and Quinliven soils, formed under relatively well drained conditions. These soils do not exhibit the significant mottling or gleying that occurs under saturated soil conditions.

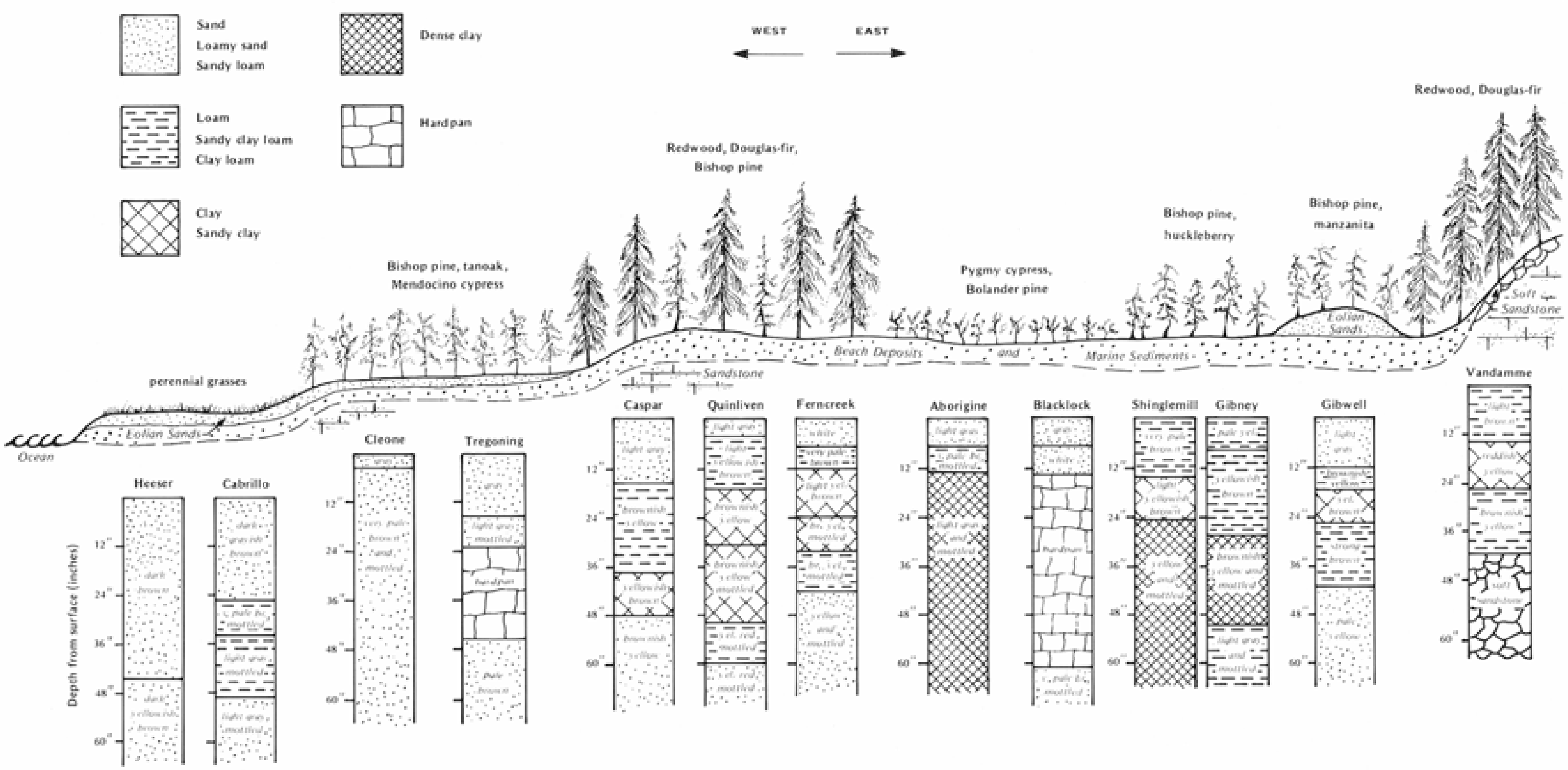

Figure 10.—Idealized illustration of the general relationships among marine terrace soils. This simplified cross-section is typical of the marine terraces near the town of Caspar. The width of the terrace system, from the ocean on the west to the mountainous uplands on the east, is approximately 4 miles at this location. Other cross-sections of the terrace system would reveal different combinations of soils. The upper terrace in this diagram represents perhaps three or more terrace levels. The diagram is not to scale.

Drainage from the nearly level central area of the terraces is restricted because of the distance of this area from gulches. The soils in these landscape positions formed under very poorly drained conditions and exhibit extreme gleying or mottling. Aborigine and Shinglemill soils are examples.

Proximity to streams that flood affects soil formation and also influences the age of the soils. Soils that are flooded are continually renewed by deposition of sediments on the surface. They are young soils and show little development of genetic horizons. Talmage, Feliz, and Bigriver soils have been subject to repeated flooding throughout the period of their formation. Deposition of thin layers of alluvium on the surface of these soils has resulted in stratification of varying texture and inherited organic matter content.

Parent Material

Parent material is the material in which a soil forms. Soils inherit physical and chemical properties from the parent material. The effects of other factors of soil formation often mask the influence of parent material, however, particularly in older soils.

Parent material can be weathering bedrock that underlies a soil body, or it can be colluvial soil and rock material that has moved, under the force of gravity, from upslope. For example, the loamy-skeletal Pardaloe and Woodin soils formed on relatively steep slopes in gravelly colluvium. Soils also form in sediments that have been moved and deposited by water or wind. The parent material of soils of the inland valleys and along narrow stream terraces is mostly stream-deposited alluvium. The soils of the coastal terraces formed in sediments deposited by the sea or in windblown sands.

Most of the mountainous uplands in the survey area are underlain by rocks of the Coastal Belt Franciscan complex. The major member of this heterogeneous assemblage of rock types is graywacke sandstone. Other included rock types are shale, siltstone, mudstone, altered basalt, and ultrabasic intrusive rocks. The Central Belt Franciscan formation, which crops out along the northern part of the eastern boundary of the survey area and south and east of Anderson Valley, also includes schist (Wagner and Bortugno, 1982).

Dehaven, Hotel, Kibesillah, and Yellowhound soils formed in Franciscan sandstones and shales in areas where the parent rock is relatively hard and coherent. These soils contain large amounts of hard rock fragments and are underlain by hard bedrock. Irmulco, Ornbaun, Tramway, and Zeni soils formed in slightly softer, less coherent sandstone. They contain fewer rock fragments than the Dehaven, Hotel, Kibesillah, and Yellowhound soils and are underlain by soft, weathered bedrock. The clayey Threechop and Vandamme soils formed in the finer grained mudstones and siltstones of the Franciscan complex.

Soils may be influenced by the chemical composition of the parent material and by physical characteristics, such as hardness and grain size. Soils that formed in metamorphosed volcanic rocks, such as Comptche and Glenblair soils, tend to have a relatively high content of iron and calcium, reflecting the abundance of these elements in the parent rock (Bailey and others, 1964). These soils have distinctive reddish colors that are thought to be related to the mineralogical composition of the parent rock.

Dann, Hiltabidel, and Littlered soils formed in the plug-like mass of ultrabasic intrusive rocks of Red Mountain. These soils inherited an unfavorable calcium-to-magnesium ratio from the parent rock. They are relatively infertile and support sparse stands of Jeffrey pine and knobcone pine. Shortyork, Updegraff, and Yorkville soils formed in the schists of the Central Belt Franciscan complex. In the southern part of the survey area, west of the San Andreas Fault, soils that formed in weathered marine sandstones and mudstones of the German Rancho, Gualala, Gallaway, and Schooner Gulch Formations include the Fishrock, Iversen, and Seaside soils (Williams and Bedrossian, 1977).

Soils on narrow terraces adjacent to streams that dissect mountainous areas and soils on the river terraces of small valleys, such as Anderson Valley and Laytonville Valley, formed in alluvium deposited by streams and rivers. The surrounding uplands, formed from Franciscan rocks, are the source of the alluvium. The grain size of the sediment deposits has influenced the texture of the present-day soils, but this influence is most obvious in the younger soils. Some soils that formed in alluvium on older river terraces no longer reflect the texture of the sediment deposit. Examples are the fine textured Perrygulch soils, which have undergone weathering and alteration over a long period of time. The high clay content of these soils is more a result of clay formation within the soil body than of a high clay content in the parent material.

The loamy-skeletal Frenchman and Talmage soils formed in gravelly alluvium deposited by swiftly flowing streams. The loamy Bigriver, Boontling, Carlain, Cottoneva, Feliz, and Pinole soils formed in medium textured alluvium deposited by more slowly moving streams. Fine textured soils, such as Cole

soils, formed in clayey alluvium that settled out from quiet waters in basins removed from active stream channels.

Soils on the coastal terraces formed in marine sediments and in eolian sands deposited on terrace platforms cut into the shoreline bedrock by the sea. This well preserved sequence of marine terraces was cut into Franciscan graywacke by wave action as the ocean level rose and fell with the melting and freezing of continental ice sheets during the Pleistocene epoch. As the sea retreated, it left the wavecut platforms covered with deposits of beach sand, marine gravels, and clays, which are the parent material of the present-day marine terrace soils. Tectonic uplift elevated the terrace system without tilting it, leaving intact a stair-step terrace sequence with the oldest terrace the furthest inland (Jenny and others, 1969; Fox, 1976).

The relatively advanced age of the older marine terraces has allowed the effects of other soil-forming factors to overshadow the influence of parent material on the soils in these areas. The soils of the younger marine terraces, which are closer to the ocean, often reflect the sandy nature of the deposits in which they formed. The coarse-loamy Cleone and Heeser soils formed in sandy windblown deposits. These soils are mainly sandy loam or loamy sand and are underlain by virtually unaltered sandy beach deposits.

The sandy Mackerricher soils formed in eolian sands on stabilized sand dunes. Gibwell soils formed on older stabilized sand dunes, which were deposited by wind on top of the older marine terraces. Although Gibwell soils are old enough to have developed a clayey subsoil, the sandy nature of the parent material is still evident in the sandy substratum within a few feet of the soil surface.

Climate

Climate provides the influx of heat and moisture that drives the whole system of soil development. Chemical and biological reactions within the soil are greatly influenced by soil temperature and moisture content. Generally, warmer temperatures and a higher content of moisture increase the rate of most reactions, such as the weathering of minerals in the parent rock, the formation of clay minerals within the soil, and the decomposition of organic matter. If the soil becomes saturated, chemical reactions requiring oxygen are slowed or stopped and other processes take place. Soil climate is further modified by topography and by the vegetative canopy, which may create micro-climates by affecting influxes of solar energy and moisture to the soil body.

Percolation of rainwater through the soil profile affects many physical processes in the soil. For example, rainwater moving downward through the soil may carry with it clay particles and dissolved minerals. These materials may be deposited within the profile, or they may be completely leached out of the soil profile.

The regional climate of the eastern part of the survey area is a Mediterranean-type climate with hot dry summers and cool rainy winters. The climate in the western part of the survey area is modified by the proximity to the Pacific Ocean. In this part of the survey area, the ocean serves to buffer seasonal and diurnal fluctuations in air and soil temperature and marine fogs reduce evapotranspiration and add moisture to the soil during the almost rainless summer months (Azevedo and Morgan, 1974). Blankets of fog precipitate moisture on foliage during the night as the air temperature drops. Summers are cool and foggy, and winters are cool and rainy.

Mean annual precipitation ranges from about 35 to 80 inches throughout the survey area. Almost all of the rain falls between November and April. Mean annual temperature ranges from about 53 degrees in the western part of the survey area to 55 to 57 degrees in the eastern part.

The relatively high rainfall in the survey area, received primarily during the winter months, has resulted in significant leaching of basic cations, such as calcium, magnesium, and sodium, from the soils. Any carbonates present in the parent material of these soils have long since been leached out. The soils that formed under these conditions tend to be acid in reaction and low in base saturation. Ultisols are common in the moist western portion of the survey area. These include the Aborigine, Caspar, Cleone, Ferncreek, Gibney, Gibwell, Quinliven, and Shinglemill soils on the marine terraces and the Iversen, Threechop, and Vandamme soils on upland hills and mountains.

The majority of the most extensive soils in the survey area are in Ultic subgroups, which are characterized by a low base saturation. These include the Casabonne, Kibesillah, Ornbaun, Wohly, Zeni, and Yellowhound soils. The Feliz, Shortyork, and Talmage soils have lower base saturation and reaction than their counterparts in the eastern Mendocino County soil survey area, where average annual precipitation is less than in this survey area.

The significant cool-season leaching and the seasonal cycle of wetting and drying are favorable for

the formation of an argillic horizon in the soils. The leaching of carbonates, a powerful flocculent, leaves clay particles more mobile and thus subject to downward movement with percolating water through the soil profile. The deposition of this clay in the subsoil is facilitated by alternate periods of wetting and drying.

Most of the soils in the survey area, including the most extensive soils, have an argillic horizon. Soils that do not have an argillic horizon generally are the younger soils that have not been in place long enough for an argillic horizon to develop.

The high winter rainfall and moist foggy summers in the western part of the survey area favor moist soil conditions, which result in deep weathering of the underlying bedrock. Many of the soils in this part of the survey area are underlain by a paralithic contact with soft, highly weathered rock. In many cases the transition between soil material and the underlying rock is so gradual that it is difficult to discern.

Time

The longer a parent material on a landscape has been subjected to the processes of soil formation, the more it will change. Weathering is deeper and genetic horizons are more strongly expressed in older soils than in younger soils.

Feliz and Pinole soils formed in loamy alluvium under similar climatic conditions. The Feliz soils, adjacent to stream channels where flooding continues to renew the soil surface, are younger than the Pinole soils. The Feliz soils do not exhibit any subsoil development. The solum, that part of the soil affected by soil-forming processes, is typically less than 30 inches thick. The Pinole soils are on older river terraces that are elevated above the present-day stream channel. The surface of these soils is relatively stable, neither receiving surface additions of sediments from flooding nor losing excessive amounts of soil to erosion because of the relatively level topography. Because of this stability, the Pinole soils are relatively old soils. They have developed a thick argillic horizon and have a solum that is more than 60 inches thick.

A soil is not necessarily the same age as the underlying bedrock. The rocks of the Franciscan complex are thought to be about 80 million years old (Bailey and others, 1964). The soils that formed in material weathered from these rocks are considerably younger. On steep mountainous land, such as much of the survey area, erosion continually removes soil material from the soil surface. At the same time, soil material is being formed from the weathering of underlying rock. Thus, the soil body is continually renewed and is considerably younger than the underlying rock. For example, the Etsel, Maymen, and Snook soils are typically on narrow ridgetops and the steep upper side slopes, where they are subject to significant erosion. They formed in material weathered from the very old Franciscan rocks, but they are nevertheless relatively young soils. The weathering of underlying bedrock into new soil material barely keeps pace with the removal of soil material by erosion. The soils as we see them today represent only a frozen segment in time of the whole process of soil formation. We can only make an educated guess as to what direction the process is taking. It is likely that renewal of the Etsel and Snook soils through weathering of bedrock is not keeping pace with erosional losses, and these soils may in time become shallower than they are now. These soils do not have significant genetic horizons. The very shallow Etsel and Snook soils exhibit no subsoil development. The shallow Maymen soils have only a cambic horizon.

Soils on sand dunes on the marine terraces between the Tenmile and Navarro Rivers dramatically illustrate the significance of time in the process of soil formation. The youngest soils of this system are on the sand dunes just south of the mouth of the Tenmile River. The unaltered sands of the dunes actually represent the parent material at “time-zero” of soil formation. Inland from these fresh deposits are dunes that have been in place long enough to be stabilized by vegetation. The Sirdrak soils are on these stabilized, but rather young, dunes. An umbric epipedon has formed in the Sirdrak soils because of additions of organic matter from perennial grasses, but subsoil development has not yet occurred. Further inland, on slightly older stabilized dunes, early stages of subsoil development are evident in the Mackerricher soils, which have a cambic horizon.

The Gibwell soils are on dunes that were deposited by wind on the older marine terraces. They are considerably older than the Sirdrak and Mackerricher soils. They have a clayey argillic horizon and a highly leached albic horizon.

Soils that formed in marine sediments on the highest terraces are considered to be very old. The cutting of the oldest terrace platforms by the sea may have taken place as much as 1 million years ago (Jenny, 1980). The terraces were not tilted by subsequent tectonic uplift. They have remained intact and relatively level and thus have not been subject to excessive erosional losses. The resulting long-term

stability of the soil surface has allowed advanced soil development. Pedogenesis over an extended period of time has resulted in pronounced alteration of the parent material. Distinct horizonation is evident in the Blacklock soils, which are Spodosols. Intensive leaching has produced an extremely acid, albic horizon that is underlain by a strongly cemented hardpan (ortstein).

Aborigine soils, which have a thick, dense claypan subsoil, formed over a long period of time under very poorly drained conditions. Extreme gleying, the result of oxygen depletion in saturated soils, is evident in these soils.

Living Organisms

Plants, animals, insects, bacteria, and fungi biologically affect soil formation. These biological forces increase the content of organic matter, affect the gain or loss of plant nutrients, and change soil structure and porosity.

The vegetation from the west boundary of the survey area eastward consists of grass, on the youngest coastal terraces; coniferous forest dominated by redwood trees on the older terraces and on mountains that have a strong or moderate marine influence; coniferous forest dominated by Douglas-fir on mountains that have little marine influence; and grass, hardwoods, and brush on some south-facing slopes.

Mallopass and Windyhollow soils formed under grass on the coastal terraces. They have a thick surface layer and a very high content of organic matter. The cool, moist climate along the coast favors luxuriant growth of grasses and forbs. As these plants decompose, large quantities of organic matter are added to the soil system. The input of organic matter into the soil system exceeds the rate at which it is decomposed by micro-organisms. The net gain of organic matter improves soil structure and water-holding capacity, increases the rate of water infiltration, and reduces the hazard of sheet erosion.

Squawrock and Witherell soils formed under grass on the mountains in the eastern part of the survey area. The pronounced dry summers in this area are not favorable to growth. The soils have a thin surface layer and a low content of organic matter. Most areas of these soils are also grazed heavily. Because much of the plant material is removed by grazing, the rate of decomposition of organic matter by micro-organisms is equal to or greater than the amount of organic matter added to the soil. These soils tend to have a weaker soil structure and are more susceptible to sheet erosion than the soils in moister areas.

Soils that formed under coniferous and hardwood forests typically have a mat of litter and duff up to 3 inches thick. This material contributes to the acidity of these soils. The mat also protects the soil surface from the erosive energy of raindrop impact. Tree roots follow cracks and fractures within the bedrock. As the growing tree roots widen the cracks, moisture is able to penetrate the bedrock, thus increasing the rate of chemical weathering.

Bacteria and fungi are important in the development of soils. These micro-organisms decompose organic matter and release nutrients that can be used again in the growth of new plants. Fungi have a high tolerance for acidity, which makes them important in acid forest soils for the decomposition of lignin. Earthworms are beneficial to all soils because their burrowing activity improves soil structure and increases the infiltration rate and permeability of soils.

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Glossary

Ablation till. Loose, permeable till deposited during the final downwasting of glacial ice. Lenses of crudely sorted sand and gravel are common.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvial cone. The material washed down the sides of mountains and hills by ephemeral streams and deposited at the mouth of gorges in the form of a moderately steep, conical mass descending equally in all directions from the point of issue.

Alluvial fan. The fanlike deposit of a stream where it issues from a gorge upon a plain or of a tributary stream near or at its junction with its main stream.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Arroyo. The flat-floored channel of an ephemeral stream, commonly with very steep to vertical banks cut in alluvium.

Aspect. The direction in which a slope faces.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 2.5
Low	2.5 to 5.0
Moderate	5.0 to 7.5
High	7.5 to 10
Very high	more than 10

Backslope. The geomorphic component that forms the steepest inclined surface and principal element of many hillsides. Backslopes in profile are commonly steep, are linear, and may or may not include cliff segments.

Basal area. The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Breast height. An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

Brush management. Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover.

Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Buffer strip. An area of porous forest soil with a protective cover of humus and litter or other material that has a nonerodible surface, which intercepts runoff from sheet flow and filters out suspended material.

Cable yarding. A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees generally are reeled in while one end is lifted or the entire log is suspended.

California bearing ratio (CBR). The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Canyon. A long, deep, narrow, very steep sided valley with high, precipitous walls in an area of high local relief.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Chemical treatment. Control of unwanted vegetation through the use of chemicals.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax plant community. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse fragments. Mineral or rock particles larger than 2 millimeters in diameter.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that is 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

Colluvium. Unconsolidated, unsorted earth material transported or deposited on side slopes and/or at the base of slopes by mass movement and by local, unconcentrated runoff.

Commercial forest land. Land that is capable of producing 20 cubic feet per acre per year of industrial wood and that is manageable for continuous timber crops.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Confidence limits. Two statistics between which, with a certain agreed probability, the parameter being estimated is expected to lie.

Conglomerate. A coarse grained, clastic rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured

material. Conglomerate is the consolidated equivalent of gravel.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cross-slope farming. Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Culmination of the mean annual increment (CMAI). The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained*. These classes are defined in the "Soil Survey Manual."

Drainage, surface. Runoff, or surface flow of water, from an area.

Draw. A small stream valley that generally is more open and has broader bottom land than a ravine or gulch.

Duff. A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

Effective rooting depth. See Potential rooting depth.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

Esker. A narrow, winding ridge of stratified gravelly and sandy drift deposited by a stream flowing in a tunnel beneath a glacier.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Extrusive rock. Igneous rock derived from deep-seated molten matter (magma) emplaced on the earth's surface.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fan terrace. A relict alluvial fan, no longer a site of active deposition, incised by younger and lower alluvial surfaces.

Fast intake (in tables). The rapid movement of water into the soil.

Ferritic. Containing more than 40 percent (by weight) iron oxide, reported as Fe_2O_3 (or 28 percent reported as Fe), in the fine-earth fraction.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity*.

Fill slope. A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.

Fine textured soil. Sandy clay, silty clay, or clay.

Firebreak. Area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flaggy soil material. Material that is, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Foothill. A steeply sloping upland that has relief of as much as 1,000 feet (300 meters) and fringes a mountain range or high-plateau escarpment.

Footslope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gilgai. Commonly, a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope. Typically, the microrelief of clayey soils that shrink and swell considerably with changes in moisture content.

Glacial drift. Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash. Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till. Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciofluvial deposits. Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gulch. A small, shallow canyon having smoothly inclined slopes and steep sides.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Head out. To form a flower head.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter

represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the “Soil Survey Manual.” The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Irrigation. Application of water to soils to assist in

production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Kame. An irregular, short ridge or hill of stratified glacial drift.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Knoll. A small, low, rounded hill rising above adjacent landforms.

Lacustrine deposit. Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low-residue crops. Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Low strength. The soil is not strong enough to support loads.

Marl. An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal amounts.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

Mass movement. The downslope movement of a portion of the land's surface, for example, a single landslide or the gradual simultaneous downhill movement of the whole mass of loose earth material on a slope face.

Mean annual increment. The total volume up to a given age divided by that age. The culmination of mean annual increment (CMAI) is the maximum value obtainable for mean annual increment. The age at which this occurs varies by species, site index, and units of measurement (i.e., cubic feet or board feet).

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mesa. A broad, nearly flat topped and commonly isolated upland mass characterized by summit widths that are more than the heights of bounding erosional scarps.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Microclimate. The essential uniform local climate of a small site.

Mineral soil. Soil that is mainly mineral material and

low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Moraine. An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, and ground.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Mountain. A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can occur as a single, isolated mass or in a group forming a chain or range.

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Mudstone. Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules. Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it generally is low in relief.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Particle-size class. A term used to characterize the grain-size composition of a whole soil. The term “texture” is used to describe the fine-earth fraction of the soil, which consists of particles with a diameter of less than 2 millimeters.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called “a soil.” A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permafrost. Layers of soil, or even bedrock, occurring in arctic or subarctic regions, in which a temperature below freezing has existed continuously for a long time.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as “saturated hydraulic conductivity,” which is defined in the “Soil Survey Manual.” In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as “permeability.” Terms describing

permeability, measured in inches per hour, are as follows:

Extremely slow	0.0 to 0.01 inch
Very slow	0.01 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plateau. An extensive upland mass with relatively flat summit area that is considerably elevated (more than 100 meters) above adjacent lowlands and separated from them on one or more sides by escarpments.

Playa. The generally dry and nearly level lake plain that occupies the lowest parts of closed depressional areas, such as those on intermontane basin floors. Temporary flooding occurs primarily in response to precipitation and runoff.

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents. It commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade. It is a form of laterite.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid or very rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Post and piling outlet. A market location where posts and pilings are bought, processed, and sold.

Potential native plant community. See Climax plant community.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning. Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Range condition. The present composition of the plant community on a range site in relation to the potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor on the basis of how much the present plant community has departed from the potential.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Range site. An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

Reaction, soil. A measure of acidity or alkalinity of a

soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Red beds. Sedimentary strata that are mainly red and are made up largely of sandstone and shale.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saprolite. Unconsolidated residual material underlying the soil and grading to hard bedrock below.

Saturated soil. The condition whereby all soil pores are filled with water.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Scarification. The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Serpentinitic. Containing more than 40 percent (by weight) serpentine material (antigorite, chrysolite, fibrolite, and talc). The growth of many common plants is hindered in areas of soils that have this kind of mineralogy.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site curve (50-year). A set of related curves on a graph that show the average height of dominant trees for a range of ages on soils that differ in productivity. Each level is represented by a curve. The basis of the curves is the height of dominant trees that are 50 years old or are 50 years old at breast height.

Site curve (100-year). A set of related curves on a graph that show the average height of dominant and codominant trees for a range of ages on soils that differ in productivity. Each level is represented by a curve. The basis of the curves is the height of dominant and codominant trees that are 100 years old or are 100 years old at breast height.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Skeletal soil. A soil in which the content of coarse fragments is 35 percent or more (by volume).

Skidding. A broadly defined term for hauling loads by sliding instead of by wheeled equipment. The timber may slide more or less entirely along the ground (ground skidding) or with its forward end supported (high-lead skidding), or it may slide entirely off the ground, along a cable (aerial skidding).

Skid road. Any way, more or less prepared, over which logs are dragged.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, the following slope classes are recognized:

Nearly level	0 to 2 percent
Gently sloping	2 to 5 percent
Moderately sloping	5 to 9 percent
Strongly sloping	9 to 15 percent
Moderately steep	15 to 30 percent
Steep	30 to 50 percent
Very steep	50 percent and higher

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Sloughed till. Water-saturated till that has flowed slowly downhill from its original place of deposit by glacial ice. It may rest on other till, on glacial outwash, or on a glaciolacustrine deposit.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Sodic (alkali) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^+ to Ca^{++} + Mg^{++}. The degrees of sodicity and their respective ratios are:

Slight	less than 13:1
Moderate	13-30:1
Strong	more than 30:1

Soft bedrock. Bedrock that can be excavated with

trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil climate. The moisture and temperature conditions existing within the soil. Definitions used for soil classification are in "Soil Taxonomy" (USDA, 1975).

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the E horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Talus. Fragments of rock and other soil material accumulated by gravity at the foot of cliffs or steep slopes.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight

angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Till plain. An extensive area of nearly level to undulating soils underlain by glacial till.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope. The outermost inclined surface at the base of a hill; part of a footslope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Tuff. A compacted deposit that is 50 percent or more volcanic ash and dust.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Varve. A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windthrow. The uprooting and tipping over of trees by the wind.

Yarding (tractor yarding, cable yarding). See Skidding.

Appendix

Key for Rating Soils for Reforestation (Seedling Mortality)

This key was used to rate the soils of the survey area for seedling mortality. The adjectives used in the ratings are:

a) Slight
b) Moderate
c) Severe

The general meanings are as defined in the SCS Woodland Manual Sec. 537.11-2. The species rated in this key are redwood, Douglas-fir, ponderosa pine, and white fir. Other species can be added. Chemical toxicities, imbalances, pH problems, and other problems, such as serpentine, are not included. Any rating may be raised one or two classes for these problems, depending on their severity. Observations in a soil survey area may be used to modify the rating. Following is a flowchart that may be helpful in fitting other species or critical soil properties into the key.

1. Soil drainage class (if the soil is subject to flooding, use b):
   a) Very poor .... severe
   b) Poor or somewhat poor 2
   c) Moderately well or better 3

2. Species being rated:
   a) Douglas-fir, ponderosa pine, or true fir .... severe
   b) Redwood 3

3. Depth to water table, claypan, or other restrictive layer:
   a) Less than 12 inches .... severe
   b) More than 12 inches 4

4. Species being rated:
   a) Redwood 5
   b) Douglas-fir 13
   c) Ponderosa pine 18
   d) White fir 19

5. Moisture-temperature regime:
   a) Aquic .... severe
   b) Udic 6
   c) Ustic-isomesic 9
   d) Other than a, b, or c .... severe

6. Surface gravel:
   a) Very gravelly (more than 35 percent) 7
   b) Not very gravelly (0 to 35 percent) .... slight

7. Are surface coarse fragments sufficient to hinder reforestation (more than about 75 percent coarse fragments)?
   a) Yes .... severe
   b) No 8

8. Steepness of slope:
   a) Less than 75 percent .... slight
   b) More than 75 percent .... moderate

9. AWC of top 24 inches of profile:
   a) More than 3.5 inches 6
   b) 2.5 to 3.5 inches 10
   c) Less than 2.5 inches .... severe

10. Surface gravel:
    a) Very gravelly (more than 35 percent) 11
    b) Not very gravelly (0 to 35 percent) .... moderate

Key for Rating Soils for Reforestation (Seedling Mortality)—Continued

11. Are surface coarse fragments sufficient to hinder reforestation (more than about 75 percent coarse fragments)?
    - a) Yes .... severe
    - b) No 12

12. Steepness of slope:
    - a) Less than 75 percent .... moderate
    - b) More than 75 percent .... severe

13. Moisture-temperature regime:
    - a) Xeric-mesic 17
    - b) Ustic 14
    - c) Udic 6
    - d) Other than a, b, or c .... severe

14. Aspect (if direction of slope is not important, use a):
    - a) North or east—azimuth 270-135 degrees 15
    - b) South—azimuth 135-270 degrees 16

15. AWC of top 24 inches of profile:
    - a) More than 2.5 inches 6
    - b) 1.5 to 2.5 inches 10
    - c) Less than 1.5 inches .... severe

16. AWC of top 24 inches of profile:
    - a) More than 3.0 inches 6
    - b) 2.0 to 3.0 inches 10
    - c) Less than 2.0 inches .... severe

17. Aspect (if direction of slope is not important, use a):
    - a) North or east—azimuth 270-135 degrees 16
    - b) South—azimuth 135-270 degrees 9

18. Moisture-temperature regime:
    - a) Xeric-mesic 14
    - b) Xeric-frigid 20

19. Annual precipitation:
    - a) Less than 20 inches .... severe
    - b) More than 20 inches 18b

20. Aspect (if direction of slope is not important, use b):
    - a) North 15
    - b) South 21

21. AWC of top 24 inches of profile:
    - a) More than 2.0 inches 6
    - b) 1.5 to 2.0 inches 10
    - c) Less than 1.5 inches .... severe

Criteria for Rating Plant Competition [1]

Rating	Drainage	Depth	Site class	Total AWC
Slight	Excessive	Less than 10 inches	5, 6	Less than 4 inches
Moderate	Somewhat excessive	10 to 20 inches	3, 4	4 to 7 inches
Severe	Well, moderately well, somewhat poor, poor, very poor	More than 20 inches	1, 2	More than 7 inches

[1] Plant competition refers to the effect of other plants (all kinds) on the growth and survival of desirable tree species—both conifers and broad-leaved trees. In most cases the desirable trees will be conifers. Plant competition is related to soil fertility, depth, available water capacity, and drainage. On wet soils competition from phreatic plants will be severe. On droughty soils plant competition will be minimal. On frigid soils the available water capacity may be one class lower. On oak woodland the rating should be severe because of grass competition.

Criteria for Rating Difficulty of Revegetating Exposed Subsoil

Subsoil horizons are frequently exposed during forest management activities. This exposure occurs on road cuts and fills and on some skid roads. Land managers may desire to revegetate these areas, and they may be required to do so by law or by regulations of an agency. Revegetation may be for erosion control or for timber production (as on old skid roads planted to trees). Separate ratings are given for revegetation with either grass or trees. The characteristics of the subsoil that influence planting conditions, germination, and the subsequent growth rate are considered in the ratings. These are general ratings; they do not preclude the need for onsite investigation of individual projects.

1. Soil moisture and/or temperature regime:
   Frigid=2; ustic=2; xeric-mesic=4; thermic=6; aquic or udic=0.
   Points: _____
2. General texture:
   Fine (SC, SIC, C)=5; moderately fine or coarser=0.
   Points: _____
3. Drainage class:
   Very poor=25; poor or somewhat poor=15; moderately well or better=0.
   Points: _____
4. Content of coarse fragments:
   0 to 35 percent=0; 35 to 65 percent=5; >65 percent=15.
   Points: _____
5. AWC of total soil profile:
   Very low (<3 inches)=10; low (3 to 6 inches)=5; moderate or higher (>6 inches)=0.
   Points: _____
6. Underlying rock or material:
   Hard bedrock with little fracturing=5; soft rock, unconsolidated material, or highly fractured rock=0.
   Points: _____
7. Original soil depth:
   >40 inches=0; 20 to 40 inches=4; 10 to 20 inches=8; <10 inches=10.
   Points: _____
8. Slope:
   0 to 30 percent=0; 30 to 50 percent=2; 50 to 75 percent=4; >75 percent=6.
   Points: _____
9. Nutrient deficiencies, imbalances, or toxicities:
   Increase rating according to the magnitude of the problem. Serpentinitic parent material is an example of the type of problem.

Add up points for each characteristic to obtain the rating—

For grass revegetation:	*Slight*	0 to 20 points
	Moderate	21 to 29 points
	Severe	30+ points
For tree revegetation:	*Slight*	0 to 13 points
	Moderate	14 to 22 points
	Severe	23+ points

Criteria for Rating Equipment Limitations [1]

Rating	Percent slope	Drainage class (wetness)	Stoniness class (surface)	Rockiness class (surface)	Texture
Slight	0 to 30	Excessive, somewhat excessive, well	None (0 to 3 percent)	None (0 to 2 percent)	Coarse textured soils—loamy sands, sands, sandy loams
			Stony (3 to 15 percent)	Rocky (2 to 10 percent)	Medium textured soils—very fine sandy loams, loam, silt loam, silt
Moderate	30 to 50 [2]	Moderately well, somewhat poor	Very stony (15 to 50 percent)	Very rocky (10 to 25 percent)	Moderately fine textured soils—clay loam, sandy clay loam, silty clay loam
Severe	50+	Poor, very poor	Extremely stony (50 to 90 percent) Rubble land (90+ percent)	Extremely rocky (25 to 50 percent) Rock outcrop (50 to 90 percent) Rubble land (90+ percent)	Fine textured soils—sandy clay, silty clay, clay

[1] Use the most limiting factor when ratings are made. Ratings are made for the principal timber-harvesting equipment, including logging trucks, bulldozers, and rubber-tired skidders. When the rating is severe, other timber-harvesting methods, including cable yarding systems and helicopters, should be given serious consideration or the logging should be postponed. The major factors influencing the ratings are slope, drainage, stoniness, rockiness, and content of clay. A combination of any two moderate ratings could classify as a severe overall rating.

Stone content (surface layer)

NSH	Class	Percent	Cropland	Range	Woodland
1	0	0 to .01	None	None	None
2	1	.01 to 0.1	Stony	None	None
3	2	0.1 to 3	Stony	None	None
4	3	3 to 15	Very stony	Stony	Stony
5	4	15 to 50	Extremely stony	Very stony	Very stony
6	5	50 to 90	Extremely stony	Extremely stony	Extremely stony
7	6	>90 (Rubble land)			

[2] Rate severe if a pickup is used in harvesting firewood.

Criteria for Rating Susceptibility to Burning Damage (Prescribed Burning and Wildfire) [1]

Soil property	Rating guide	Rating guide	Rating guide	Rating assigned
Content of organic matter in the top 4 inches	>1 percent Rating=1	<1 percent Rating=2	---	#___
Content of coarse fragments in the top 4 inches	<35 percent Rating=1	35 to 65 percent Rating=2	>65 percent Rating=5	#___
Texture in the top 4 inches	SCL, CL, SICL, SC, SIC, C Rating=1	L, SIL, SI Rating=2	S, LS, SL Rating=3	#___
Slope (percent)	0 to 30 Rating=1	30 to 50 Rating=2	>50 Rating=3	#___
				Total=___

Total rating	*Susceptibility to burning damage* [2]
4 to 6	Slight
7 to 9	Moderate
10 to 13	Severe

[1] Soil damage can sometimes occur from burning. The risk of damage increases with the intensity of heat. The damage is mainly related to the loss of organic matter. Some soils have characteristics that enable them to withstand this loss better than other soils. These characteristics are used to rate the soils for their susceptibility to damage from burning, as expressed in the table. The rating system is intended to be used as a general guideline. Other factors not mentioned may alter the rating.

[2] Rate soils predominantly on southeast to west aspects (135 to 270 degrees azimuth) one category higher.

Criteria for Rating Soil Compaction Hazard [1]

USDA texture in the top 10 inches	Ochric epipedon		Mollic or umbric epipedon
	Weak or platy structure [2]	Moderate or strong structure	
Volume of coarse fragments >65 percent, all textures, and all ashy, ashy-skeletal, medial, medial-skeletal, and cindery material	Slight	Slight	Slight
Volume of coarse fragments 35 to 65 percent, all very gravelly textures (skeletal soils)	Moderate	Slight	Slight
Volume of coarse fragments < 35 percent:			
S, LS	Slight	Slight	Slight
SCL, SC, FS, LFS, FSL, SL	Severe	Moderate	Moderate
L, SIL, SICL	Severe	Moderate	Slight
C, SIC	Moderate	Slight	Slight

[1] A rating of severe indicates that the soil is easily compacted and compaction is not easily mitigated, moderate indicates that the soil is compacted with moderate effort and compaction is easily mitigated, and slight indicates that considerable effort is needed to compact the soil.

[2] Very coarse prismatic structure is regarded as weak, essentially massive.

Criteria for Rating Erosion Hazard on Disturbed Forest Land [1]

Slope (percent)	K value			
	<.16	.16-.25	.25-.40	[2] >.40
0 to 9	Slight	Slight	Slight	Slight
9 to 15	Slight	Slight	Slight	Moderate
15 to 30	Slight	Slight	Moderate	Severe
30 to 50	Slight	Moderate	Severe	Severe
50 to 75	Moderate	Severe	Severe	Severe
75+	Severe	Severe	Severe	Severe

[1] Rating only for sheet and rill erosion. Mass movement is a function of slope, geology, mineralogy, depth and type of restrictive layer, and amount and type of disturbance. If the soil or unit has an obvious tendency to slump, this should be mentioned separately in the description. The rating could be described in the following manner: “The hazard of sheet and rill erosion is (slight, moderate, severe) under common management practices.” The rating may be adjusted up or down, depending on whether a USLE “C” factor = 0.08 is considered too low or too high for tractor logging. For each increase or decrease of 0.05 in the “C” factor due to harvest methods and/or field observations, raise or lower the rating one slope group.

[2] Includes coarse textured soils over decomposed granite.

Tables

Table 1.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
101	Abalobadiah-Bruhel-Vizcaino complex, 30 to 50 percent slopes	1,830	0.2
102	Abalobadiah-Bruhel-Vizcaino complex, 50 to 75 percent slopes	2,760	0.3
103	Bearwallow-Wolfey complex, 5 to 15 percent slopes	1,530	0.1
104	Bearwallow-Wolfey complex, 15 to 30 percent slopes	2,755	0.3
105	Biaggi loam, 0 to 5 percent slopes	690	0.1
106	Biaggi loam, 5 to 15 percent slopes	655	0.1
107	Bigriver loamy sand, 0 to 5 percent slopes	4,745	0.5
108	Blacklock and Aborigine soils, 0 to 5 percent slopes	2,135	0.2
109	Boontling loam, 2 to 9 percent slopes	1,600	0.2
110	Boontling loam, 9 to 15 percent slopes	190	*
111	Boontling loam, 15 to 30 percent slopes	285	*
112	Branscomb-Usal complex, 30 to 50 percent slopes	1,015	0.1
113	Branscomb-Usal complex, 50 to 75 percent slopes	4,750	0.5
114	Bruhel loam, 2 to 9 percent slopes	435	*
115	Bruhel-Abalobadiah-Vizcaino complex, 9 to 30 percent slopes	1,045	0.1
116	Bruhel-Shinglemill complex, 2 to 15 percent slopes	955	0.1
117	Cabrillo-Heeser complex, 0 to 5 percent slopes	3,985	0.4
118	Carlain loam, 2 to 9 percent slopes	2,320	0.2
119	Casabonne-Wohly complex, 9 to 30 percent slopes	27,175	2.6
120	Casabonne-Wohly complex, 30 to 50 percent slopes	45,930	4.4
121	Casabonne-Wohly-Pardaloe complex, 50 to 75 percent slopes	14,705	1.4
122	Caspar sandy loam, 2 to 9 percent slopes	655	0.1
123	Caspar-Quinliven complex, 30 to 50 percent slopes	490	*
124	Caspar-Quinliven-Ferncreek complex, 9 to 30 percent slopes	5,000	0.5
125	Cleone loamy sand, 0 to 9 percent slopes	160	*
126	Coastal beaches	325	*
127	Cole loam, 0 to 5 percent slopes	1,345	0.1
128	Cole loam, drained, 0 to 2 percent slopes	200	*
129	Comptche-Zeni complex, 30 to 50 percent slopes	1,840	0.2
130	Comptche-Zeni complex, 50 to 75 percent slopes	585	0.1
131	Cottoneva loam, 0 to 2 percent slopes	1,570	0.2
132	Crispin loam, 0 to 5 percent slopes	1,550	0.1
133	Dann-Hiltabidel complex, 30 to 50 percent slopes	2,415	0.2
134	Dann-Littlered-Hiltabidel complex, 5 to 30 percent slopes	935	0.1
135	Dehaven-Hotel complex, 50 to 75 percent slopes	55,010	5.3
136	Dehaven-Hotel complex, 75 to 99 percent slopes	5,560	0.5
137	Dehaven-Hotel-Irmulco complex, 30 to 50 percent slopes	10,325	1.0
138	Duneland	1,870	0.2
139	Dystropepts, 30 to 75 percent slopes	7,545	0.7
140	Feliz loam, 0 to 5 percent slopes	1,160	0.1
141	Ferncreek sandy loam, 2 to 9 percent slopes	8,490	0.8
142	Fishrock-Iversen complex, 2 to 15 percent slopes	1,050	0.1
143	Fishrock-Iversen complex, 15 to 30 percent slopes	390	*
144	Flumeville clay loam, 0 to 5 percent slopes	1,670	0.2
145	Flumeville clay loam, 5 to 15 percent slopes	1,070	0.1
146	Garcia-Snook-Gube complex, 50 to 75 percent slopes	5,400	0.5
147	Gibney-Gibwell complex, 2 to 15 percent slopes	630	0.1
148	Gibwell loamy sand, 2 to 9 percent slopes	135	*
149	Gibwell loamy sand, 9 to 15 percent slopes	125	*
150	Glenblair gravelly loam, 9 to 30 percent slopes	105	*
151	Glenblair gravelly loam, 30 to 50 percent slopes	395	*
152	Glenblair gravelly loam, 50 to 75 percent slopes	1,015	0.1
153	Gschwend-Frenchman complex, 0 to 9 percent slopes	9,425	0.9
154	Gube-Garcia-Snook complex, 30 to 50 percent slopes	3,310	0.3
155	Haploxeralfs-Argixerolls complex, 0 to 9 percent slopes	1,705	0.2
156	Haploxeralfs, wet-Argixerolls complex, 0 to 5 percent slopes	780	0.1
157	Harecreek sandy loam, 2 to 9 percent slopes	650	0.1
158	Havensneck sandy loam, 2 to 15 percent slopes	325	*
159	Havensneck sandy loam, 15 to 30 percent slopes	340	*
160	Havensneck-Seaside complex, 5 to 30 percent slopes	175	*
161	Heeser sandy loam, 2 to 15 percent slopes	1,585	0.2
162	Hiltabidel-Dann complex, 5 to 75 percent slopes	1,385	0.1

See footnote at end of table.

Table 1.--Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Acres	Percent
163	Holohan-Hollowtree complex, 50 to 75 percent slopes	26,780	2.6
164	Holohan-Hollowtree-Casabonne complex, 9 to 30 percent slopes	5,390	0.5
165	Holohan-Hollowtree-Casabonne complex, 30 to 50 percent slopes	53,070	5.1
166	Hopland loam, 30 to 50 percent slopes	1,745	0.2
167	Hopland loam, 50 to 75 percent slopes	1,745	0.2
168	Hopland-Squawrock association, 50 to 75 percent slopes	4,925	0.5
169	Hopland-Witherell-Squawrock complex, 30 to 50 percent slopes	7,130	0.7
170	Hopland-Wohly complex, 30 to 50 percent slopes	8,160	0.8
171	Hopland-Wohly complex, 50 to 75 percent slopes	11,195	1.1
172	Irmulco-Tramway complex, 9 to 30 percent slopes	11,205	1.1
173	Irmulco-Tramway complex, 30 to 50 percent slopes	54,690	5.2
174	Irmulco-Tramway complex, 50 to 75 percent slopes	34,355	3.3
175	Iversen loam, 2 to 15 percent slopes	1,690	0.2
176	Iversen loam, 15 to 30 percent slopes	445	*
177	Iversen sandy loam, 2 to 15 percent slopes	1,325	0.1
178	Kibesillah-Yellowhound complex, 75 to 99 percent slopes	3,295	0.3
179	Littlered clay loam, 2 to 9 percent slopes	675	0.1
180	Mackerricher sandy loam, 2 to 9 percent slopes	355	*
181	Mackerricher sandy loam, 9 to 30 percent slopes	500	*
182	Mallopass loam, 0 to 5 percent slopes	1,160	0.1
183	Mallopass loam, 5 to 15 percent slopes	980	0.1
184	Mallopass loam, 15 to 30 percent slopes	280	*
185	Maymen-Etsel-Snook complex, 30 to 75 percent slopes	9,310	0.9
186	Maymen-Woodin-Etsel complex, 30 to 75 percent slopes	13,510	1.3
187	Ornbaun-Zeni complex, 9 to 30 percent slopes	33,385	3.2
188	Ornbaun-Zeni complex, 30 to 50 percent slopes	89,490	8.6
189	Ornbaun-Zeni complex, 50 to 75 percent slopes	51,190	4.9
190	Pardaloe-Woodin complex, 50 to 75 percent slopes	8,020	0.8
191	Pardaloe-Woodin-Casabonne complex, 30 to 50 percent slopes	7,570	0.7
192	Perrygulch loam, 0 to 9 percent slopes	540	0.1
193	Pinole loam, 2 to 9 percent slopes	1,430	0.1
194	Pinole loam, 9 to 15 percent slopes	255	*
195	Pits and Dumps	115	*
196	Quinliven-Ferncreek complex, 2 to 15 percent slopes	8,035	0.8
197	Riverwash	2,125	0.2
198	Seaside-Rock outcrop complex, 5 to 30 percent slopes	360	*
199	Shinglemill-Gibney complex, 2 to 9 percent slopes	7,210	0.7
200	Shortyork-Tyson-Witherell complex, 30 to 50 percent slopes	615	0.1
201	Shortyork-Yorkville-Witherell complex, 9 to 15 percent slopes	2,430	0.2
202	Shortyork-Yorkville-Witherell complex, 15 to 30 percent slopes	11,240	1.1
203	Shortyork-Yorkville-Witherell complex, 30 to 50 percent slopes	4,460	0.4
204	Sirdrak loamy sand, 0 to 15 percent slopes	1,020	0.1
205	Squawrock-Garcia-Witherell complex, 15 to 50 percent slopes	8,695	0.8
206	Squawrock-Garcia-Witherell complex, 50 to 75 percent slopes	9,280	0.9
207	Squawrock-Witherell complex, 15 to 50 percent slopes	6,890	0.7
208	Squawrock-Witherell complex, 50 to 75 percent slopes	740	0.1
209	Stornetta fine sandy loam, 0 to 2 percent slopes	1,100	0.1
210	Talmage gravelly loam, 0 to 2 percent slopes	510	*
211	Threechop-Ornbaun complex, 9 to 30 percent slopes	7,755	0.7
212	Tregoning-Cleone complex, 0 to 5 percent slopes	1,735	0.2
213	Tregoning-Cleone complex, 5 to 15 percent slopes	565	0.1
214	Tropaquepts, 0 to 15 percent slopes	3,860	0.4
215	Tyson-Updegraff complex, 9 to 30 percent slopes	600	0.1
216	Tyson-Updegraff complex, 30 to 50 percent slopes	665	0.1
217	Updegraff loam, 30 to 50 percent slopes	5,820	0.6
218	Updegraff-Hopland-Woodin complex, 30 to 50 percent slopes	2,145	0.2
219	Urban land	1,555	0.1
220	Usal-Branscomb complex, 75 to 99 percent slopes	845	0.1
221	Vandamme loam, 9 to 30 percent slopes	21,540	2.1
222	Vandamme-Caspar complex, 2 to 15 percent slopes	1,075	0.1
223	Vandamme-Irmulco complex, 20 to 50 percent slopes	2,600	0.2
224	Vandamme-Irmulco-Tramway complex, 50 to 75 percent slopes	3,010	0.3

See footnote at end of table.

Table 1.--Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Acres	Percent
225	Windyhollow loam, 0 to 5 percent slopes	795	0.1
226	Windyhollow loam, 5 to 15 percent slopes	675	0.1
227	Windyhollow loam, 15 to 30 percent slopes	150	*
228	Witherell-Hopland-Squawrock complex, 50 to 75 percent slopes	900	0.1
229	Wolfey-Bearwallow complex, 30 to 50 percent slopes	6,395	0.6
230	Wolfey-Bearwallow complex, 50 to 75 percent slopes	1,725	0.2
231	Woodin-Yellowhound complex, 30 to 50 percent slopes	20,175	1.9
232	Woodin-Yellowhound complex, 50 to 75 percent slopes	11,050	1.1
233	Xerochrepts-Haploxeralfs-Argixerolls complex, 9 to 30 percent slopes	410	*
234	Xerochrepts-Haploxeralfs-Argixerolls complex, 30 to 50 percent slopes	240	*
235	Yellowhound-Kibesillah complex, 50 to 75 percent slopes	63,650	6.1
236	Yellowhound-Kibesillah-Ornbaun complex, 9 to 30 percent slopes	2,185	0.2
237	Yellowhound-Kibesillah-Ornbaun complex, 30 to 50 percent slopes	41,785	4.0
238	Yellowhound-Woodin complex, 50 to 75 percent slopes	15,090	1.4
239	Yellowhound-Woodin-Ornbaun complex, 9 to 30 percent slopes	1,080	0.1
240	Yellowhound-Woodin-Ornbaun complex, 30 to 50 percent slopes	22,685	2.2
241	Yorkville-Hopland association, 30 to 50 percent slopes	2,635	0.3
242	Yorkville-Squawrock-Witherell complex, 15 to 30 percent slopes	3,525	0.3
243	Yorkville-Squawrock-Witherell complex, 30 to 50 percent slopes	8,380	0.8
244	Yorkville-Yorktree-Squawrock complex, 15 to 30 percent slopes	1,415	0.1
245	Yorkville-Yorktree-Squawrock complex, 30 to 50 percent slopes	6,130	0.6
246	Access denied	5,980	0.6
247	Water	770	0.1
	Total	1,042,400	100.0

* Less than 0.1 percent.

Table 2.--Prime Farmland

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

Map symbol	Soil name
109	Boontling loam, 2 to 9 percent slopes (where irrigated)
114	Bruhel loam, 2 to 9 percent slopes (where irrigated)
117	Cabrillo-Heeser complex, 0 to 5 percent slopes (where irrigated)
127	Cole loam, 0 to 5 percent slopes (where irrigated)
128	Cole loam, drained, 0 to 2 percent slopes (where irrigated)
140	Feliz loam, 0 to 5 percent slopes (where irrigated)
180	Mackerricher sandy loam, 2 to 9 percent slopes (where irrigated)
182	Mallopass loam, 0 to 5 percent slopes (where irrigated)
192	Perrygulch loam, 0 to 9 percent slopes (where irrigated)
193	Pinole loam, 2 to 9 percent slopes (where irrigated)
209	Stornetta fine sandy loam, 0 to 2 percent slopes (where protected from flooding or not frequently flooded during the growing season)
225	Windyhollow loam, 0 to 5 percent slopes (where irrigated)

Table 3.--Land Capability

(N means nonirrigated; I means irrigated)

Soil name and map symbol	Land capability	
	N	I
101----------------------- Abalobadiah-Bruhel-Vizcaino	VIe	---
102----------------------- Abalobadiah-Bruhel-Vizcaino	VIIe	---
103----------------------- Bearwallow-Wolfey	IVe-1	---
104----------------------- Bearwallow-Wolfey	IVe-1	IVe-1
105, 106------------------ Biaggi	IIIe-1	IIIe-1
107----------------------- Bigriver	IVw-2	---
108----------------------- Blacklock and Aborigine	VIIw	---
109----------------------- Boontling	IIIw-2	IIw-2
110----------------------- Boontling	IIIe-2	IIIe-2
111----------------------- Boontling	IVe-2	IVe-2
112----------------------- Branscomb-Usal	VIe	---
113----------------------- Branscomb-Usal	VIIe	---
114----------------------- Bruhel	IIIe-1	---
115----------------------- Bruhel-Abalobadiah-Vizcaino	IVe-1	---
116----------------------- Bruhel-Shinglemill	IIIe-1	
117----------------------- Cabrillo-Heeser	IIIw-2	---
118----------------------- Carlain	IIIe-1	---
119----------------------- Casabonne-Wohly	IVe-1	---
120----------------------- Casabonne-Wohly	VIe	---

Table 3.--Land Capability--Continued

Soil name and map symbol	Land capability N	Land capability I
121------------------------ Casabonne-Wohly-Pardaloe	VIIe	---
122------------------------ Caspar	IIIe-1	---
123------------------------ Caspar-Quinliven	VIe	---
124------------------------ Caspar-Quinliven-Ferncreek	IVe-1	---
125------------------------ Cleone	IVe-4	---
126------------------------ Coastal beaches	VIII	---
127------------------------ Cole	IIIw-3	IIw-3
128------------------------ Cole	IIIs-3	IIs-3
129------------------------ Comptche-Zeni	VIe	---
130------------------------ Comptche-Zeni	VIIe	---
131------------------------ Cottoneva	IVw-2	---
132------------------------ Crispin	IIIe-3	IIIe-3
133------------------------ Dann-Hiltabidel	VIIs	---
134------------------------ Dann-Littlered-Hiltabidel	VIIs	---
135, 136------------------- Dehaven-Hotel	VIIe	---
137------------------------ Dehaven-Hotel-Irmulco	VIe	---
138------------------------ Duneland	VIII	---
139------------------------ Dystropepts	VIIe	---
140------------------------ Feliz	IIIe-1	IIe-1
141------------------------ Ferncreek	IIIe-2	---
142------------------------ Fishrock-Iversen	VIe	---

Table 3.--Land Capability--Continued

Soil name and map symbol	Land capability N	Land capability I
143 Fishrock-Iversen	VIe	---
144 Flumeville	IIIw-2	IIw-2
145 Flumeville	IIIw-2	IIIw-2
146 Garcia-Snook-Gube	VIIe	---
147 Gibney-Gibwell	IVe-3	---
148, 149 Gibwell	IVe-3	---
150 Glenblair	IVe-1	---
151 Glenblair	VIe	---
152 Glenblair	VIIe	---
153 Gschwend-Frenchman	IVs-0	---
154 Gube-Garcia-Snook	VIIe	---
155 Haploxeralfs-Argixerolls	IIe-1	---
156:		
Haploxeralfs, wet	IIIw-2	---
Argixerolls	IIe-2	---
157 Harecreek	IIIe-1	---
158 Havensneck	IIIe-8	---
159 Havensneck	IVe-1	---
160 Havensneck-Seaside	VIIs	---
161 Heeser	IIIe-1	---
162 Hiltabidel-Dann	VIIs	---
163 Holohan-Hollowtree	VIIs	---

Table 3.--Land Capability--Continued

Soil name and map symbol	Land capability	
	N	I
164 Holohan-Hollowtree-Casabonne	IVe-1	---
165 Holohan-Hollowtree-Casabonne	VIe	---
166 Hopland	VIe	---
167 Hopland	VIIe	---
168 Hopland-Squawrock	VIIe	---
169 Hopland-Witherell-Squawrock	VIe	---
170 Hopland-Wohly	VIe	---
171 Hopland-Wohly	VIIe	---
172 Irmulco-Tramway	IVe-1	---
173 Irmulco-Tramway	VIe	---
174 Irmulco-Tramway	VIIe	---
175 Iversen	IIIe-1	---
176 Iversen	IVe-1	---
177 Iversen	IIIe-1	---
178 Kibesillah-Yellowhound	VIIe	---
179 Littlered	VIe	---
180 Mackerricher	IIIe-4	---
181 Mackerricher	IVe-4	---
182 Mallopass	IIIe-2	IIe-2
183 Mallopass	IIIe-1	IIIe-1

Table 3.--Land Capability--Continued

Soil name and map symbol	Land capability N	Land capability I
184 Mallopass	IVe-1	IVe-1
185 Maymen-Etsel-Snook	VIIe	---
186 Maymen-Woodin-Etsel	VIIe	---
187 Ornbaun-Zeni	IVe-1	---
188 Ornbaun-Zeni	VIe	---
189 Ornbaun-Zeni	VIIe	---
190 Pardaloe-Woodin	VIIs	---
191 Pardaloe-Woodin-Casabonne	VIe	---
192 Perrygulch	IIIw-2	---
193 Pinole	IIIe-1	IIe-1
194 Pinole	IIIe-1	IIIe-1
195 Pits and Dumps	VIII	---
196 Quinliven-Ferncreek	IIIe-1	---
197 Riverwash	VIII	---
198 Seaside-Rock outcrop	VIIs	---
199 Shinglemill-Gibney	IIIw-2	---
200 Shortyork-Tyson-Witherell	VIe	---
201 Shortyork-Yorkville-Witherell	VIe	---
202 Shortyork-Yorkville-Witherell	VIe	---
203 Shortyork-Yorkville-Witherell	VIe	---

Table 3.--Land Capability--Continued

Soil name and map symbol	Land capability N	Land capability I
204 Sirdrak	IIIe-4	---
205 Squawrock-Garcia-Witherell	VIe	---
206 Squawrock-Garcia-Witherell	VIIe	---
207 Squawrock-Witherell	VIe	---
208 Squawrock-Witherell	VIIe	---
209 Stornetta	IVw-2	IVw-2
210 Talmage	IVs-4	IVs-4
211 Threechop-Ornbaun	IVe-1	---
212, 213 Tregoning-Cleone	IVe-2	---
214 Tropaquepts	VIII	---
215 Tyson-Updegraff	VIe	---
216 Tyson-Updegraff	VIe	---
217 Updegraff	VIe	---
218 Updegraff-Hopland-Woodin	VIe	---
219. Urban land		
220 Usal-Branscomb	VIIe	---
221 Vandamme	IVe-1	---
222 Vandamme-Caspar	IIIe-1	---
223 Vandamme-Irmulco	VIe	---
224 Vandamme-Irmulco-Tramway	VIIe	---

Table 3.--Land Capability--Continued

Soil name and map symbol	Land capability N	Land capability I
225: Windyhollow	IIIw-2	IIw-2
226: Windyhollow	IIIw-1	IIIw-1
227: Windyhollow	IVe-1	IVe-1
228: Witherell-Hopland-Squawrock	VIIe	---
229: Wolfey-Bearwallow	VIe	---
230: Wolfey-Bearwallow	VIIe	---
231: Woodin-Yellowhound	VIe	---
232: Woodin-Yellowhound	VIIe	---
233: Xerochrepts-Haploxeralfs-Argixerolls	IVe-1	---
234: Xerochrepts-Haploxeralfs-Argixerolls	VIe	---
235: Yellowhound-Kibesillah	VIIe	---
236: Yellowhound-Kibesillah-Ornbaun	IVe-1	---
237: Yellowhound-Kibesillah-Ornbaun	VIe	---
238: Yellowhound-Woodin	VIIe	---
239: Yellowhound-Woodin-Ornbaun	VIs	---
240: Yellowhound-Woodin-Ornbaun	VIe	---
241: Yorkville-Hopland	VIe	---
242: Yorkville-Squawrock-Witherell	VIe	---

Table 3.--Land Capability--Continued

Soil name and map symbol	Land capability	
	N	I
243----------------------- Yorkville-Squawrock-Witherell	VIe	---
244----------------------- Yorkville-Yorktree-Squawrock	IVe-1	---
245----------------------- Yorkville-Yorktree-Squawrock	VIe	---

Table 4.--Rangeland Productivity and Characteristic Plant Communities

(Only the soils that support rangeland vegetation suitable for grazing are listed)

Soil name and map symbol	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
101, 102:					
Abalobadiah	Perennial Grass - Loamy Hills (4b).	Favorable	4,500	Purple needlegrass	25
		Normal	3,500	Hairy oatgrass	25
		Unfavorable	2,500	Common velvetgrass	10
				California oatgrass	10
Bruhel	Perennial Grass - Loamy Hills (4b).	Favorable	4,500	Purple needlegrass	25
		Normal	3,500	Hairy oatgrass	25
		Unfavorable	2,500	Common velvetgrass	10
				California oatgrass	10
Vizcaino	Perennial Grass - Loamy Hills (4b).	Favorable	4,500	Purple needlegrass	25
		Normal	3,500	Hairy oatgrass	25
		Unfavorable	2,500	Common velvetgrass	10
				California oatgrass	10
103, 104:					
Bearwallow	Annual Grass - Loamy (15d)	Favorable	3,800	Wild oat	30
		Normal	3,000	Soft chess	15
		Unfavorable	2,000	Filaree	10
				Ripgut brome	10
				Clover	10
				Purple needlegrass	5
				Burclover	5
				Foxtail barley	5
Wolfey	Annual Grass - Loamy (15d)	Favorable	3,500	Wild oat	30
		Normal	2,500	Foxtail fescue	10
		Unfavorable	1,800	Soft chess	10
				Ripgut brome	10
				Filaree	10
				Purple needlegrass	5
				Foxtail barley	5
				Clover	5
105, 106 Biaggi	Perennial Grass - Loamy Terrace (4b).	Favorable	5,000	California oatgrass	50
		Normal	4,500	Hairy oatgrass	15
		Unfavorable	4,000	Common velvetgrass	15
109, 110, 111 Boontling	Perennial Grass - Deep Loamy (4b).	Favorable	5,000	California oatgrass	50
		Normal	4,000	Blue wildrye	10
		Unfavorable	3,000	Ryegrass	10
114 Bruhel	Perennial Grass - Loamy Hills (4b).	Favorable	5,000	California oatgrass	50
		Normal	4,500	Hairy oatgrass	15
		Unfavorable	4,000	Common velvetgrass	15
115:					
Bruhel	Perennial Grass - Loamy Hills (4b).	Favorable	4,500	Purple needlegrass	25
		Normal	3,500	Hairy oatgrass	25
		Unfavorable	2,500	Common velvetgrass	10
				California oatgrass	10
Abalobadiah	Perennial Grass - Loamy Hills (4b).	Favorable	4,500	Purple needlegrass	25
		Normal	3,500	Hairy oatgrass	25
		Unfavorable	2,500	Common velvetgrass	10
				California oatgrass	10

Table 4.--Rangeland Productivity and Characteristic Plant Communities--Continued

Soil name and map symbol	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
115:					
Vizcaino	Perennial Grass - Loamy Hills (4b).	Favorable	4,500	Purple needlegrass	25
		Normal	3,500	Hairy oatgrass	25
		Unfavorable	2,500	Common velvetgrass	10
				California oatgrass	10
117:					
Cabrillo	Perennial Grass - Sandy Loam Terrace (4b).	Favorable	5,000	Bentgrass	45
		Normal	4,500	Common velvetgrass	15
		Unfavorable	4,000	Sweet vernalgrass	15
Heeser	Perennial Grass - Sandy Loam Terrace (4b).	Favorable	5,000	Bentgrass	45
		Normal	4,500	Common velvetgrass	15
		Unfavorable	4,000	Sweet vernalgrass	15
132 Crispin	Perennial Grass - Sandy Loam Terrace (4b).	Favorable	5,000	Bentgrass	45
		Normal	4,500	Common velvetgrass	15
		Unfavorable	4,000	Sweet vernalgrass	15
144, 145 Flumeville	Perennial Grass - Semiwet Meadow (4b).	Favorable	7,000	Common velvetgrass	30
		Normal	6,000	Bentgrass	30
		Unfavorable	5,500	California oatgrass	20
161 Heeser	Perennial Grass - Sandy Loam Terrace (4b).	Favorable	5,000	Bentgrass	45
		Normal	4,500	Common velvetgrass	15
		Unfavorable	4,000	Sweet vernalgrass	15
168:					
Hopland.					
Squawrock	Annual Grass - Very Gravelly Loamy (15d).	Favorable	2,600	Wild oat	20
		Normal	2,200	Soft chess	20
		Unfavorable	1,400	Broadleaf filaree	10
				Foxtail fescue	5
				Purple needlegrass	5
				Burclover	5
169:					
Hopland.					
Witherell	Annual Grass - Shallow Loamy (15d).	Favorable	2,400	Soft chess	30
		Normal	1,800	Wild oat	15
		Unfavorable	1,200	Filaree	10
				Burclover	10
				Silver hairgrass	10
				Clover	10
				Foxtail fescue	5
Squawrock	Annual Grass - Very Gravelly Loamy (15d).	Favorable	2,600	Wild oat	20
		Normal	2,200	Soft chess	20
		Unfavorable	1,400	Broadleaf filaree	10
				Foxtail fescue	5
				Purple needlegrass	5
				Burclover	5
182, 183 Mallopass	Perennial Grass - Loamy Terrace (4b).	Favorable	5,000	California oatgrass	50
		Normal	4,500	Hairy oatgrass	15
		Unfavorable	4,000	Common velvetgrass	15
184 Mallopass	Perennial Grass - Loamy Terrace (4b).	Favorable	5,000	California oatgrass	50
		Normal	4,500	Hairy oatgrass	15
		Unfavorable	4,000	Common velvetgrass	15

Table 4.--Rangeland Productivity and Characteristic Plant Communities--Continued

Soil name and map symbol	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
192--------------- Perrygulch	Annual Grass - Loamy Claypan (15d).	Favorable	3,200	Slender oat	20
		Normal	2,600	Wild oat	15
		Unfavorable	1,800	Soft chess	15
				Foxtail fescue	10
				Filaree	10
193, 194---------- Pinole	Annual Grass - Deep Loamy (14d).	Favorable	4,500	Slender oat	25
		Normal	4,000	Ripgut brome	25
		Unfavorable	3,000	Soft chess	10
				Purple needlegrass	10
200:					
Shortyork---------	Perennial Grass - Very Gravelly Loamy (15d).	Favorable	2,800	Red fescue	20
		Normal	1,900	Soft chess	10
		Unfavorable	1,100	Ripgut brome	10
				California oatgrass	10
				Wild oat	5
				Clover	5
				Filaree	5
				Sheep fescue	5
				Tufted hairgrass	5
				Blue wildrye	5
Tyson.					
Witherell---------	Annual Grass - Shallow Loamy (15d).	Favorable	2,400	Soft chess	30
		Normal	1,800	Wild oat	15
		Unfavorable	1,200	Filaree	10
				Burclover	10
				Silver hairgrass	10
				Clover	10
				Foxtail fescue	5
201, 202, 203:					
Shortyork---------	Perennial Grass - Very Gravelly Loamy (15d).	Favorable	2,800	Red fescue	20
		Normal	1,900	Soft chess	10
		Unfavorable	1,100	Ripgut brome	10
				California oatgrass	10
				Wild oat	5
				Clover	5
				Filaree	5
				Sheep fescue	5
				Tufted hairgrass	5
				Blue wildrye	5
Yorkville---------	Perennial Grass - Clayey Unstable (15d).	Favorable	2,800	California oatgrass	15
		Normal	2,300	Soft chess	10
		Unfavorable	1,600	Purple needlegrass	10
				Wild oat	10
				Red fescue	10
				Idaho fescue	10
				Burclover	5
				Filaree	5
				Ripgut brome	5

Table 4.--Rangeland Productivity and Characteristic Plant Communities--Continued

Soil name and map symbol	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
201, 202, 203:					
Witherell	Annual Grass - Shallow Loamy (15d).	Favorable	2,400	Soft chess	30
		Normal	1,800	Wild oat	15
		Unfavorable	1,200	Filaree	10
				Burclover	10
				Silver hairgrass	10
				Clover	10
				Foxtail fescue	5
205, 206:					
Squawrock	Annual Grass - Very Gravelly Loamy (15d).	Favorable	2,600	Wild oat	20
		Normal	2,200	Soft chess	20
		Unfavorable	1,400	Broadleaf filaree	10
				Foxtail fescue	5
				Purple needlegrass	5
				Burclover	5
Garcia.					
Witherell	Annual Grass - Shallow Loamy (15d).	Favorable	2,400	Soft chess	30
		Normal	1,800	Wild oat	15
		Unfavorable	1,200	Filaree	10
				Burclover	10
				Silver hairgrass	10
				Clover	10
				Foxtail fescue	5
207, 208:					
Squawrock	Annual Grass - Very Gravelly Loamy (15d).	Favorable	2,600	Wild oat	20
		Normal	2,200	Soft chess	20
		Unfavorable	1,400	Broadleaf filaree	10
				Foxtail fescue	5
				Purple needlegrass	5
				Burclover	5
Witherell	Annual Grass - Shallow Loamy (15d).	Favorable	2,400	Soft chess	30
		Normal	1,800	Wild oat	15
		Unfavorable	1,200	Filaree	10
				Burclover	10
				Silver hairgrass	10
				Clover	10
				Foxtail fescue	5
210 Talmage	Annual Grass - Very Gravelly Loamy Bottom Land (14d).	Favorable	2,200	Soft chess	20
		Normal	1,500	Filaree	20
		Unfavorable	800	Wild oat	5
				Silver hairgrass	5
				Ripgut brome	5
				Dogtail	5
				Prairie threeawn	5
				Medusahead	5
				Turkeymullein	5
				Red brome	5
				Foxtail fescue	5
				Annual lupine	5
225, 226, 227 Windyhollow	Perennial Grass - Loamy Terrace (4b).	Favorable	5,000	California oatgrass	50
		Normal	4,500	Hairy oatgrass	15
		Unfavorable	4,000	Common velvetgrass	15

Table 4.--Rangeland Productivity and Characteristic Plant Communities--Continued

Soil name and map symbol	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
228:					
Witherell	Annual Grass - Shallow Loamy (15d).	Favorable	2,400	Soft chess	30
		Normal	1,800	Wild oat	15
		Unfavorable	1,200	Filaree	10
				Burclover	10
				Silver hairgrass	10
				Clover	10
				Foxtail fescue	5
Hopland.					
Squawrock	Annual Grass - Very Gravelly Loamy (15d).	Favorable	2,600	Wild oat	20
		Normal	2,200	Soft chess	20
		Unfavorable	1,400	Broadleaf filaree	10
				Foxtail fescue	5
				Purple needlegrass	5
				Burclover	5
229, 230:					
Wolfey	Annual Grass - Loamy (15d)	Favorable	3,500	Wild oat	30
		Normal	2,500	Foxtail fescue	10
		Unfavorable	1,800	Soft chess	10
				Ripgut brome	10
				Filaree	10
				Purple needlegrass	5
				Foxtail barley	5
				Clover	5
Bearwallow	Annual Grass - Loamy (15d)	Favorable	3,800	Wild oat	30
		Normal	3,000	Soft chess	15
		Unfavorable	2,000	Filaree	10
				Ripgut brome	10
				Clover	10
				Purple needlegrass	5
				Burclover	5
				Foxtail barley	5
241:					
Yorkville	Annual Grass - Clayey Unstable (15d).	Favorable	3,300	Wild oat	30
		Normal	2,500	Soft chess	15
		Unfavorable	1,200	Burclover	10
				Filaree	10
				Ripgut brome	10
				Purple needlegrass	5
				Foxtail fescue	5
Hopland.					
242, 243:					
Yorkville	Annual Grass - Clayey Unstable (15d).	Favorable	3,300	Wild oat	30
		Normal	2,500	Soft chess	15
		Unfavorable	1,200	Burclover	10
				Filaree	10
				Ripgut brome	10
				Purple needlegrass	5
				Foxtail fescue	5

Table 4.--Rangeland Productivity and Characteristic Plant Communities--Continued

Soil name and map symbol	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
242, 243:					
Squawrock	Annual Grass - Very Gravelly Loamy (15d).	Favorable	2,600	Wild oat	20
		Normal	2,200	Soft chess	20
		Unfavorable	1,400	Broadleaf filaree	10
				Foxtail fescue	5
				Purple needlegrass	5
				Burclover	5
Witherell	Annual Grass - Shallow Loamy (15d).	Favorable	2,400	Soft chess	30
		Normal	1,800	Wild oat	15
		Unfavorable	1,200	Filaree	10
				Burclover	10
				Silver hairgrass	10
				Clover	10
				Foxtail fescue	5
244, 245:					
Yorkville	Annual Grass - Clayey Unstable (15d).	Favorable	3,300	Wild oat	30
		Normal	2,500	Soft chess	15
		Unfavorable	1,200	Burclover	10
				Filaree	10
				Ripgut brome	10
				Purple needlegrass	5
				Foxtail fescue	5
Yorktree.					
Squawrock	Annual Grass - Very Gravelly Loamy (15d).	Favorable	2,600	Wild oat	20
		Normal	2,200	Soft chess	20
		Unfavorable	1,400	Broadleaf filaree	10
				Foxtail fescue	5
				Purple needlegrass	5
				Burclover	5

Table 5.--Woodland Productivity

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that data were not available)

Soil name and map symbol	Ordination symbol	Commonly grown trees	Potential productivity: Site index* Mean	Potential productivity: Site index* Confidence interval**
107	23A	Redwood	188	+16
Bigriver				
112, 113:				
Branscomb	21R	Redwood	178	---
		Douglas-fir	191	---
Usal	13R	Redwood	161	+16
		Douglas-fir	174	+13
118	15A	Redwood	152	---
Carlain		Douglas-fir	183	---
119:				
Casabonne	11A	Douglas-fir	153	+5
Wohly	8A	Douglas-fir	118	+10
120:				
Casabonne	10R	Douglas-fir	144	---
Wohly	8R	Douglas-fir	118	+10
121:				
Casabonne	10R	Douglas-fir	144	---
Wohly	8R	Douglas-fir	118	+10
Pardaloe	8R	Douglas-fir	122	+4
122	11A	Redwood	125	+33
Caspar		Douglas-fir	146	---
123:				
Caspar	11R	Redwood	125	+33
		Douglas-fir	146	---
Quinliven	11R	Redwood	124	+9
		Douglas-fir	135	+11
124:				
Caspar	11A	Redwood	125	+33
		Douglas-fir	146	---
Quinliven	11A	Redwood	124	+9
		Douglas-fir	135	+11
Ferncreek	13A	Redwood	136	+8
		Douglas-fir	159	+11
129, 130:				
Comptche	8R	Douglas-fir	122	---
		Redwood	135	+17
Zeni	9R	Douglas-fir	129	+10
		Redwood	130	+13

See footnotes at end of table.

Table 5.--Woodland Productivity--Continued

Soil name and map symbol	Ordination symbol	Commonly grown trees	Site index* Mean	Site index* Confidence interval**
131----------------------- Cottoneva	7W	Red alder-------------	92	---
135, 136:				
Dehaven-------------------	16R	Redwood---------------	153	+15
		Douglas-fir-----------	183	+12
Hotel---------------------	13R	Redwood---------------	123	+21
		Douglas-fir-----------	156	+23
137:				
Dehaven-------------------	16R	Redwood---------------	153	+15
		Douglas-fir-----------	183	+12
Hotel---------------------	13R	Redwood---------------	123	+21
		Douglas-fir-----------	156	+23
Irmulco-------------------	18R	Redwood---------------	165	+8
		Douglas-fir-----------	191	+10
141----------------------- Ferncreek	13A	Redwood---------------	136	+8
		Douglas-fir-----------	159	+11
142, 143:				
Fishrock.				
Iversen-------------------	5A	Douglas-fir-----------	87	---
		Redwood---------------	127	---
150----------------------- Glenblair	15A	Redwood---------------	152	+31
		Douglas-fir-----------	158	+38
151, 152------------------ Glenblair	15R	Redwood---------------	152	+31
		Douglas-fir-----------	158	+38
153:				
Gschwend------------------	13A	Douglas-fir-----------	168	+18
		Redwood---------------	157	+26
Frenchman-----------------	11A	Douglas-fir-----------	154	+27
		Redwood---------------	135	---
155:				
Haploxeralfs--------------	7-12C	Ponderosa pine--------	101-134	---
		Douglas-fir-----------	85-141	---
		California black oak--	---	---
Argixerolls---------------	7-12W	Ponderosa pine--------	98-133	---
		Douglas-fir-----------	97-131	---
		California black oak--	---	---
156:				
Haploxeralfs, wet---------	7-12W	Ponderosa pine--------	101-134	---
		Douglas-fir-----------	85-141	---
Argixerolls---------------	7-12W	Ponderosa pine--------	98-133	---
		Douglas-fir-----------	97-131	---
		California black oak--	---	---
157----------------------- Harecreek	9A	Redwood---------------	108	---
		Douglas-fir-----------	121	---

See footnotes at end of table.

Table 5.--Woodland Productivity--Continued

Soil name and map symbol	Ordination symbol	Commonly grown trees	Potential productivity: Site index* Mean	Site index* Confidence interval**
158, 159 Havensneck	6A	Redwood	102	---
		Douglas-fir	101	---
163:				
Holohan	9R	Douglas-fir	132	+6
Hollowtree	6R	Douglas-fir	106	+4
164:				
Holohan	9F	Douglas-fir	132	+6
Hollowtree	6F	Douglas-fir	106	+4
Casabonne	10A	Douglas-fir	144	---
165:				
Holohan	9R	Douglas-fir	132	+6
Hollowtree	6R	Douglas-fir	106	+4
Casabonne	10R	Douglas-fir	144	---
166, 167 Hopland	1R	California black oak	44	+5
168:				
Hopland	1R	California black oak	44	+5
Squawrock.				
169:				
Hopland	1R	California black oak	44	+5
Witherell.				
Squawrock.				
170, 171:				
Hopland	1R	California black oak	44	+5
Wohly	8R	Douglas-fir	118	+10
172:				
Irmulco	18A	Redwood	165	+8
		Douglas-fir	191	+10
Tramway	13A	Redwood	141	+12
		Douglas-fir	161	+11
173, 174:				
Irmulco	18R	Redwood	165	+8
		Douglas-fir	191	+10
Tramway	13R	Redwood	141	+12
		Douglas-fir	161	+11
175, 176, 177 Iversen	5A	Douglas-fir	87	---
		Redwood	127	---

See footnotes at end of table.

Table 5.--Woodland Productivity--Continued

Soil name and map symbol	Ordination symbol	Commonly grown trees	Site index* Mean	Site index* Confidence interval**
178:				
Kibesillah	7R	Douglas-fir	109	+3
		Redwood	109	---
Yellowhound	10R	Douglas-fir	140	+17
		Redwood	135	+17
180, 181 Mackerricher	14A	Douglas-fir	145	---
		Redwood	159	---
187:				
Ornbaun	11A	Douglas-fir	155	+6
		Redwood	152	+13
Zeni	9R	Douglas-fir	129	+10
		Redwood	130	+13
188, 189:				
Ornbaun	11R	Douglas-fir	155	+6
		Redwood	152	+13
Zeni	9R	Douglas-fir	129	+10
		Redwood	130	+13
190:				
Pardaloe	8R	Douglas-fir	122	+4
Woodin	6R	Douglas-fir	97	+17
191:				
Pardaloe	8R	Douglas-fir	122	+4
Woodin	6R	Douglas-fir	97	+17
Casabonne	10R	Douglas-fir	144	---
196:				
Quinliven	11A	Redwood	124	+9
		Douglas-fir	135	+11
Ferncreek	13A	Redwood	136	+8
		Douglas-fir	159	+11
200:				
Shortyork.				
Tyson	1R	Oregon white oak	---	---
Witherell.				
211:				
Threechop	11A	Douglas-fir	151	+39
		Redwood	144	+13
Ornbaun	11A	Douglas-fir	155	+6
		Redwood	152	+13
215:				
Tyson	1F	Oregon white oak	---	---

See footnotes at end of table.

Table 5.--Woodland Productivity--Continued

Soil name and map symbol	Ordination symbol	Potential productivity: Commonly grown trees	Site index*: Mean	Site index*: Confidence interval**
215:				
Updegraff	1C	Oregon white oak	---	---
		California black oak	31	---
216:				
Tyson	1R	Oregon white oak	---	---
Updegraff	1R	Oregon white oak	---	---
		California black oak	31	---
217 Updegraff	1R	Oregon white oak	---	---
		California black oak	31	---
218:				
Updegraff	1R	Oregon white oak	---	---
		California black oak	31	---
Hopland	1R	California black oak	44	+5
Woodin	6R	Douglas-fir	97	+17
220:				
Usal	17R	Redwood	161	+16
		Douglas-fir	174	+13
Branscomb	21R	Redwood	178	---
		Douglas-fir	191	---
221 Vandamme	18C	Redwood	165	+12
		Douglas-fir	179	+13
222:				
Vandamme	18C	Redwood	165	+12
		Douglas-fir	179	+13
Caspar	11A	Redwood	125	+33
		Douglas-fir	146	---
223:				
Vandamme	18R	Redwood	165	+12
		Douglas-fir	179	+13
Irmulco	18R	Redwood	165	+8
		Douglas-fir	191	+10
224:				
Vandamme	18R	Redwood	165	+12
		Douglas-fir	179	+13
Irmulco	18R	Redwood	165	+8
		Douglas-fir	191	+10
Tramway	13R	Redwood	141	+12
		Douglas-fir	161	+11
228:				
Witherell.				
Hopland	1R	California black oak	44	+5
Squawrock.				

See footnotes at end of table.

Table 5.--Woodland Productivity--Continued

Soil name and map symbol	Ordination symbol	Commonly grown trees	Potential productivity: Site index* Mean	Site index* Confidence interval**
231, 232:				
Woodin	6R	Douglas-fir	97	+17
Yellowhound	10R	Douglas-fir	140	+17
		Redwood	135	+17
233:				
Xerochrepts	7-12F	Ponderosa pine	101-134	---
		Douglas-fir	85-141	---
Haploxeralfs	7-12C	Ponderosa pine	101-134	---
		Douglas-fir	85-141	---
Argixerolls	7-12W	Ponderosa pine	98-133	---
		Douglas-fir	97-131	---
234:				
Xerochrepts	7-12R	Ponderosa pine	101-134	---
		Douglas-fir	85-141	---
Haploxeralfs	7-12R	Ponderosa pine	101-134	---
		Douglas-fir	85-141	---
Argixerolls	7-12R	Ponderosa pine	98-133	---
		Douglas-fir	97-131	---
235:				
Yellowhound	10R	Douglas-fir	140	+17
		Redwood	135	+17
Kibesillah	7R	Douglas-fir	109	+3
		Redwood	109	---
236:				
Yellowhound	10F	Douglas-fir	140	+17
		Redwood	135	+17
Kibesillah	7F	Douglas-fir	109	+3
		Redwood	109	---
Ornbaun	11A	Douglas-fir	155	+6
		Redwood	152	+13
237:				
Yellowhound	10R	Douglas-fir	140	+17
		Redwood	135	+17
Kibesillah	7R	Douglas-fir	109	+3
		Redwood	109	---
Ornbaun	11R	Douglas-fir	155	+6
		Redwood	152	+13
238:				
Yellowhound	10R	Douglas-fir	140	+17
		Redwood	135	+17
Woodin	6R	Douglas-fir	97	+17

See footnotes at end of table.

Table 5.--Woodland Productivity--Continued

Soil name and map symbol	Ordination symbol	Commonly grown trees	Potential productivity: Site index* Mean	Potential productivity: Site index* Confidence interval**
239:				
Yellowhound	10F	Douglas-fir	140	+17
		Redwood	135	+17
Woodin	6F	Douglas-fir	97	+17
Ornbaun	11A	Douglas-fir	155	+6
		Redwood	152	+13
240:				
Yellowhound	10R	Douglas-fir	140	+17
		Redwood	135	+17
Woodin	6R	Douglas-fir	97	+17
Ornbaun	11R	Douglas-fir	155	+6
		Redwood	152	+13
241:				
Yorkville.				
Hopland	1R	California black oak	44	+5
244:				
Yorkville.				
Yorktree	1C	California black oak	30	---
		Interior live oak	---	---
Squawrock.				
245:				
Yorkville.				
Yorktree	1R	California black oak	30	---
		Interior live oak	---	---
Squawrock.				

* See text for an explanation of the site curves used.
** Confidence interval is 95 percent.

Table 6.--Woodland Management Concerns

(See text for definitions of "slight," "moderate," and "severe." Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that data were not available)

Soil name and map symbol	Seedling mortality	Plant competition	Limitation for revegetating exposed subsoil with-- Grasses	Limitation for revegetating exposed subsoil with-- Trees	Equipment limitation	Hazard of soil damage from-- Fire	Hazard of soil damage from-- Compaction	Hazard of sheet and rill erosion: Bare soil surface	Hazard of sheet and rill erosion: When logs are yarded by-- Tractor	Hazard of sheet and rill erosion: When logs are yarded by-- Cable systems
107------------------ Bigriver	Slight	Severe	Slight	Slight	Slight	Slight	Moderate	Slight	Slight	---
112:										
Branscomb-----------	Slight	Severe	Slight	Moderate	Moderate	Slight	Slight	Moderate	Slight	Slight.
Usal----------------	Slight	Severe	Slight	Moderate	Moderate	Slight	Slight	Moderate	Slight	Slight.
113:										
Branscomb-----------	Slight	Severe	Slight	Moderate	Severe	Slight	Slight	Severe	Slight	Slight.
Usal----------------	Slight	Severe	Slight	Moderate	Severe	Slight	Slight	Severe	Moderate	Slight.
118------------------ Carlain	Slight	Severe	Slight	Slight	Slight	Slight	Moderate	Slight	Slight	---
119:										
Casabonne-----------	Slight	Severe	Slight	Slight	Slight	Slight	Moderate	Moderate	Slight	---
Wohly---------------	Moderate	Moderate	Slight	Moderate	Slight	Slight	Moderate	Moderate	Slight	---
120:										
Casabonne-----------	Slight	Severe	Slight	Slight	Moderate	Slight	Moderate	Moderate	Slight	Slight.
Wohly---------------	Moderate	Moderate	Slight	Moderate	Moderate	Slight	Moderate	Severe	Moderate	Moderate.
121:										
Casabonne-----------	Slight	Severe	Slight	Slight	Severe	Slight	Moderate	Severe	Moderate	Slight.
Wohly---------------	Moderate	Moderate	Slight	Moderate	Severe	Slight	Moderate	Severe	Severe	Moderate.
Pardaloe------------	Severe	Slight	Moderate	Severe	Severe	Slight	Slight	Severe	Moderate	Slight.
122------------------ Caspar	Moderate	Severe	Slight	Slight	Slight	Slight	Severe	Slight	Slight	---
123:										
Caspar--------------	Moderate	Severe	Slight	Slight	Moderate	Moderate	Severe	Severe	Moderate	Moderate.
Quinliven-----------	Moderate	Severe	Slight	Slight	Moderate	Moderate	Severe	Severe	Moderate	Moderate.

Table 6.--Woodland Management Concerns--Continued

Soil name and map symbol	Seedling mortality	Plant competition	Limitation for revegetating exposed subsoil with-- Grasses	Limitation for revegetating exposed subsoil with-- Trees	Equipment limitation	Hazard of soil damage from-- Fire	Hazard of soil damage from-- Compaction	Hazard of sheet and rill erosion: Bare soil surface	Hazard of sheet and rill erosion: When logs are yarded by-- Tractor	Hazard of sheet and rill erosion: When logs are yarded by-- Cable systems
124:										
Caspar	Moderate	Severe	Slight	Slight	Slight	Slight	Severe	Moderate	Slight	Slight.
Quinliven	Moderate	Severe	Slight	Slight	Moderate	Slight	Severe	Moderate	Slight	Slight.
Ferncreek	Moderate	Severe	Slight	Slight	Moderate	Slight	Severe	Moderate	Slight	Slight.
129:										
Comptche	Slight	Severe	Slight	Slight	Moderate	Slight	Moderate	Moderate	Slight	Slight.
Zeni	Slight	Severe	Slight	Slight	Moderate	Slight	Moderate	Severe	Moderate	Moderate.
130:										
Comptche	Slight	Severe	Slight	Slight	Severe	Slight	Moderate	Severe	Moderate	Slight.
Zeni	Slight	Severe	Slight	Moderate	Severe	Slight	Moderate	Severe	Severe	Moderate.
131 Cottoneva	Severe	Severe	Slight	Severe	Moderate	Slight	Moderate	Slight	Slight	---
135:										
Dehaven	Slight	Moderate	Moderate	Moderate	Severe	Slight	Slight	Severe	Moderate	Slight.
Hotel	Slight	Moderate	Slight	Moderate	Severe	Slight	Slight	Severe	Moderate	Slight.
136:										
Dehaven	Moderate	Moderate	Moderate	Severe	Severe	Moderate	Slight	Severe	Severe	Slight.
Hotel	Moderate	Slight	Slight	Moderate	Severe	Moderate	Slight	Severe	Severe	Slight.
137:										
Dehaven	Slight	Moderate	Slight	Moderate	Moderate	Slight	Slight	Moderate	Slight	Slight.
Hotel	Slight	Moderate	Slight	Moderate	Moderate	Slight	Slight	Moderate	Slight	Slight.
Irmulco	Slight	Severe	Slight	Slight	Moderate	Slight	Moderate	Severe	Slight	Slight.
141 Ferncreek	Moderate	Severe	Slight	Slight	Moderate	Slight	Severe	Slight	Slight	---
142, 143:										
Fishrock.										
Iversen	Moderate	Moderate	Slight	Moderate	Slight	Slight	Moderate	Moderate*	Slight	---

See footnotes at end of table.

Table 6.--Woodland Management Concerns--Continued

Soil name and map symbol	Seedling mortality	Plant competition	Limitation for revegetating exposed subsoil with-- Grasses	Limitation for revegetating exposed subsoil with-- Trees	Equipment limitation	Hazard of soil damage from-- Fire	Hazard of soil damage from-- Compaction	Hazard of sheet and rill erosion: Bare soil surface	Hazard of sheet and rill erosion: When logs are yarded by-- Tractor	Hazard of sheet and rill erosion: When logs are yarded by-- Cable systems
150------------------ Glenblair	Slight	Severe	Slight	Slight	Slight	Slight	Moderate	Moderate*	Slight	---
151------------------ Glenblair	Slight	Severe	Slight	Slight	Moderate	Slight	Moderate	Moderate	Slight	Slight.
152------------------ Glenblair	Slight	Severe	Slight	Slight	Severe	Slight	Moderate	Severe	Moderate	Slight.
153:										
Gschwend------------	Slight	Severe	Slight	Slight	Slight	Slight	Moderate	Slight	Slight	---
Frenchman-----------	Moderate	Severe	Slight	Moderate	Slight	Slight	Slight	Slight	Slight	---
155:										
Haploxeralfs--------	Moderate	Severe	Slight	Moderate	Moderate**	Slight	Severe**	Slight	Slight	---
Argixerolls---------	Moderate	Severe	Slight	Moderate	Slight	Slight	Severe**	Slight	Slight	---
156:										
Haploxeralfs, wet---	Severe	Severe	Moderate	Severe	Severe**	Slight	Severe**	Slight	Slight	---
Argixerolls---------	Moderate	Severe	Slight	Moderate	Slight	Slight	Severe**	Slight	Slight	---
157------------------ Harecreek	Slight	Severe	Slight	Slight	Slight	Slight	Severe	Moderate*	Slight	---
158------------------ Havensneck	Slight	Severe	Slight	Slight	Slight	Slight	Moderate	Moderate*	Slight	---
159------------------ Havensneck	Slight	Severe	Slight	Slight	Slight	Slight	Moderate	Moderate	Slight	---
163:										
Holohan-------------	Severe	Moderate	Moderate	Severe	Severe	Slight	Slight	Severe	Moderate	Slight.
Hollowtree----------	Severe	Moderate	Moderate	Severe	Severe	Moderate	Slight	Severe	Moderate	Slight.
164:										
Holohan-------------	Severe	Moderate	Moderate	Severe	Slight	Slight	Slight	Moderate*	Slight	---
Hollowtree----------	Severe	Moderate	Moderate	Severe	Slight	Moderate	Slight	Moderate*	Slight	---
Casabonne-----------	Slight	Severe	Slight	Slight	Slight	Slight	Moderate	Moderate*	Slight	---

See footnotes at end of table.

Table 6.--Woodland Management Concerns--Continued

Soil name and map symbol	Seedling mortality	Plant competition	Limitation for revegetating exposed subsoil with--		Equipment limitation	Hazard of soil damage from--		Hazard of sheet and rill erosion		
								Bare soil surface	When logs are yarded by--	
			Grasses	Trees		Fire	Compaction		Tractor	Cable systems
165:										
Holohan-------------	Severe	Moderate	Moderate	Severe	Moderate	Slight	Slight	Moderate	Slight	Slight.
Hollowtree----------	Severe	Moderate	Moderate	Severe	Moderate	Moderate	Slight	Moderate	Moderate	Slight.
Casabonne-----------	Slight	Severe	Slight	Slight	Moderate	Slight	Moderate	Moderate	Slight	Slight.
166------------------ Hopland	Moderate	Moderate	Slight	Moderate	Moderate	Slight	Moderate	Severe	Moderate	Moderate.
167------------------ Hopland	Moderate	Moderate	Slight	Moderate	Severe	Slight	Moderate	Severe	Severe	Moderate.
168:										
Hopland-------------	Moderate	Moderate	Slight	Moderate	Severe	Slight	Moderate	Severe	Severe	Moderate.
Squawrock.										
169:										
Hopland-------------	Moderate	Moderate	Slight	Moderate	Moderate	Slight	Moderate	Severe	Moderate	Moderate.
Witherell.										
Squawrock.										
170:										
Hopland-------------	Moderate	Moderate	Slight	Moderate	Moderate	Slight	Moderate	Severe	Moderate	Moderate.
Wohly---------------	Moderate	Moderate	Slight	Moderate	Moderate	Slight	Moderate	Severe	Moderate	Moderate.
171:										
Hopland-------------	Moderate	Moderate	Slight	Moderate	Severe	Slight	Moderate	Severe	Severe	Moderate.
Wohly---------------	Moderate	Moderate	Slight	Moderate	Severe	Slight	Moderate	Severe	Severe	Moderate.
172:										
Irmulco-------------	Slight	Severe	Slight	Slight	Slight	Slight	Moderate	Moderate	Slight	---
Tramway-------------	Slight	Severe	Slight	Slight	Slight	Slight	Moderate	Moderate	Slight	---
173:										
Irmulco-------------	Slight	Severe	Slight	Slight	Moderate	Slight	Moderate	Severe	Slight	Slight.

See footnotes at end of table.

Table 6.--Woodland Management Concerns--Continued

Soil name and map symbol	Seedling mortality	Plant competition	Limitation for revegetating exposed subsoil with--		Equipment limitation	Hazard of soil damage from--		Hazard of sheet and rill erosion		
								Bare soil surface	When logs are yarded by--	
			Grasses	Trees		Fire	Compaction		Tractor	Cable systems
173:										
Tramway-------------	Slight	Severe	Slight	Slight	Moderate	Slight	Moderate	Severe	Slight	Slight.
174:										
Irmulco-------------	Slight	Severe	Slight	Slight	Severe	Slight	Moderate	Severe	Moderate	Slight.
Tramway-------------	Slight	Severe	Slight	Slight	Severe	Slight	Moderate	Severe	Moderate	Slight.
175, 176, 177-------- Iversen	Moderate	Moderate	Slight	Moderate	Slight	Slight	Moderate	Moderate*	Slight	---
178:										
Kibesillah----------	Severe	Slight	Severe	Severe	Severe	Slight	Slight	Severe	Severe	Slight.
Yellowhound---------	Severe	Severe	Moderate	Severe	Severe	Moderate	Moderate	Severe	Severe	Slight.
180------------------ Mackerricher	Moderate	Moderate	Slight	Moderate	Slight	Moderate	Moderate	Slight	Slight	---
181------------------ Mackerricher	Moderate	Moderate	Slight	Moderate	Slight	Moderate	Moderate	Moderate	Slight	---
187:										
Ornbaun-------------	Slight	Severe	Slight	Slight	Slight	Slight	Moderate	Moderate	Slight	---
Zeni----------------	Slight	Severe	Slight	Slight	Slight	Slight	Moderate	Moderate	Slight	---
188:										
Ornbaun-------------	Slight	Severe	Slight	Slight	Moderate	Slight	Moderate	Severe	Moderate	Slight.
Zeni----------------	Slight	Severe	Slight	Slight	Moderate	Slight	Moderate	Severe	Moderate	Slight.
189:										
Ornbaun-------------	Slight	Severe	Slight	Slight	Severe	Slight	Moderate	Severe	Moderate	Slight.
Zeni----------------	Slight	Severe	Slight	Slight	Severe	Slight	Moderate	Severe	Severe	Moderate.
190:										
Pardaloe------------	Severe	Slight	Moderate	Severe	Severe	Slight	Slight	Severe	Moderate	Slight.
Woodin--------------	Severe	Slight	Severe	Severe	Severe	Moderate	Slight	Severe	Severe	Slight.
191:										
Pardaloe------------	Severe	Slight	Moderate	Severe	Moderate	Slight	Slight	Moderate	Slight	Slight.

See footnotes at end of table.

Table 6.--Woodland Management Concerns--Continued

Soil name and map symbol	Seedling mortality	Plant competition	Limitation for revegetating exposed subsoil with--		Equipment limitation	Hazard of soil damage from--		Hazard of sheet and rill erosion		
								Bare soil surface	When logs are yarded by--	
			Grasses	Trees		Fire	Compaction		Tractor	Cable systems
191:										
Woodin	Severe	Slight	Severe	Severe	Moderate	Moderate	Slight	Moderate	Slight	Slight.
Casabonne	Slight	Severe	Slight	Slight	Moderate	Slight	Moderate	Moderate	Slight	Slight.
196:										
Quinliven	Moderate	Severe	Slight	Slight	Moderate	Slight	Severe	Moderate*	Slight	---
Ferncreek	Moderate	Severe	Slight	Slight	Moderate	Slight	Severe	Moderate*	Slight	---
200:										
Shortyork.										
Tyson	Severe	Moderate	Moderate	Severe	Moderate	Slight	Moderate	Moderate	Slight	Slight.
Witherell.										
211:										
Threechop	Slight	Severe	Slight	Slight	Slight	Slight	Moderate	Moderate	Slight	---
Ornbaun	Slight	Severe	Slight	Slight	Slight	Slight	Moderate	Moderate	Slight	---
215:										
Tyson	Severe	Moderate	Moderate	Severe	Slight	Slight	Moderate	Moderate*	Slight	---
Updegraff	Moderate	Severe	Slight	Moderate	Moderate	Slight	Moderate	Moderate	Slight	---
216:										
Tyson	Severe	Moderate	Moderate	Severe	Moderate	Slight	Moderate	Moderate	Slight	Slight.
Updegraff	Moderate	Severe	Slight	Moderate	Severe	Slight	Moderate	Severe	Slight	Slight.
217 Updegraff	Moderate	Severe	Slight	Moderate	Severe	Slight	Moderate	Severe	Slight	Slight.
218:										
Updegraff	Moderate	Severe	Slight	Moderate	Severe	Slight	Moderate	Severe	Slight	Slight.
Hopland	Moderate	Moderate	Slight	Moderate	Moderate	Slight	Moderate	Severe	Moderate	Moderate.
Woodin	Severe	Slight	Severe	Severe	Moderate	Moderate	Slight	Moderate	Slight	Slight.

See footnotes at end of table.

Table 6.--Woodland Management Concerns--Continued

Soil name and map symbol	Seedling mortality	Plant competition	Limitation for revegetating exposed subsoil with-- Grasses	Limitation for revegetating exposed subsoil with-- Trees	Equipment limitation	Hazard of soil damage from-- Fire	Hazard of soil damage from-- Compaction	Hazard of sheet and rill erosion: Bare soil surface	Hazard of sheet and rill erosion: When logs are yarded by-- Tractor	Hazard of sheet and rill erosion: When logs are yarded by-- Cable systems
220:										
Usal	Moderate	Severe	Moderate	Moderate	Severe	Slight	Moderate	Severe	Severe	Slight.
Branscomb	Moderate	Severe	Moderate	Moderate	Severe	Slight	Slight	Severe	Severe	Slight.
221 Vandamme	Slight	Severe	Slight	Slight	Slight	Slight	Slight	Moderate	Slight	---
222:										
Vandamme	Slight	Severe	Slight	Slight	Slight	Slight	Slight	Moderate*	Slight	---
Caspar	Slight	Severe	Slight	Slight	Slight	Moderate	Severe	Moderate*	Slight	---
223:										
Vandamme	Slight	Severe	Slight	Slight	Moderate	Slight	Slight	Severe	Slight	Slight.
Irmulco	Slight	Severe	Slight	Slight	Moderate	Slight	Moderate	Severe	Slight	Slight.
224:										
Vandamme	Slight	Severe	Slight	Slight	Severe	Slight	Slight	Severe	Moderate	Slight.
Irmulco	Slight	Severe	Slight	Slight	Severe	Slight	Moderate	Severe	Moderate	Slight.
Tramway	Slight	Severe	Slight	Slight	Severe	Slight	Moderate	Severe	Moderate	Slight.
228:										
Witherell.										
Hopland	Moderate	Moderate	Slight	Moderate	Severe	Slight	Moderate	Severe	Severe	Moderate.
Squawrock.										
231:										
Woodin	Severe	Slight	Severe	Severe	Moderate	Moderate	Slight	Severe	Slight	Slight.
Yellowhound	Moderate	Severe	Slight	Moderate	Moderate	Slight	Moderate	Severe	Slight	Slight.
232:										
Woodin	Severe	Slight	Severe	Severe	Severe	Moderate	Slight	Moderate	Moderate	Slight.
Yellowhound	Moderate	Severe	Moderate	Moderate	Severe	Slight	Moderate	Moderate	Moderate	Slight.

See footnotes at end of table.

Table 6.--Woodland Management Concerns--Continued

Soil name and map symbol	Seedling mortality	Plant competition	Limitation for revegetating exposed subsoil with--		Equipment limitation	Hazard of soil damage from--		Hazard of sheet and rill erosion		
								Bare soil surface	When logs are yarded by--	
			Grasses	Trees		Fire	Compaction		Tractor	Cable systems
233:										
Xerochrepts---------	Moderate	Severe	Slight	Moderate	Moderate**	Moderate	Moderate	Moderate**	Moderate**	---
Haploxeralfs--------	Moderate	Severe	Slight	Moderate	Moderate**	Slight	Severe**	Moderate	Slight	---
Argixerolls---------	Moderate	Severe	Slight	Moderate	Slight	Slight	Severe**	Moderate	Slight	---
234:										
Xerochrepts---------	Moderate	Severe	Slight	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Slight.
Haploxeralfs--------	Moderate	Severe	Slight	Moderate	Moderate	Moderate*	Severe**	Severe	Moderate	Slight.
Argixerolls---------	Moderate	Severe	Slight	Moderate	Moderate	Moderate	Severe**	Severe	Moderate	Slight.
235:										
Yellowhound---------	Moderate	Severe	Moderate	Moderate	Severe	Slight	Moderate	Severe	Moderate	Slight.
Kibesillah----------	Moderate	Moderate	Moderate	Severe	Severe	Slight	Slight	Severe	Moderate	Slight.
236:										
Yellowhound---------	Moderate	Severe	Slight	Moderate	Slight	Slight	Moderate	Moderate	Slight	---
Kibesillah----------	Moderate	Moderate	Moderate	Severe	Slight	Slight	Slight	Moderate*	Slight	---
Ornbaun-------------	Slight	Severe	Slight	Slight	Slight	Slight	Moderate	Moderate	Slight	---
237:										
Yellowhound---------	Moderate	Severe	Slight	Moderate	Moderate	Slight	Moderate	Moderate	Slight	Slight.
Kibesillah----------	Moderate	Moderate	Moderate	Severe	Moderate	Slight	Slight	Moderate	Slight	Slight.
Ornbaun-------------	Slight	Severe	Slight	Slight	Moderate	Slight	Moderate	Severe	Moderate	Slight.
238:										
Yellowhound---------	Moderate	Severe	Moderate	Moderate	Severe	Slight	Moderate	Severe	Moderate	Slight.
Woodin--------------	Severe	Slight	Severe	Severe	Severe	Moderate	Slight	Severe	Severe	Slight.
239:										
Yellowhound---------	Moderate	Severe	Slight	Moderate	Slight	Slight	Moderate	Moderate	Slight	---
Woodin--------------	Severe	Slight	Severe	Severe	Slight	Moderate	Slight	Moderate*	Slight	---
Ornbaun-------------	Slight	Severe	Slight	Slight	Slight	Slight	Moderate	Moderate	Slight	---

See footnotes at end of table.

Table 6.--Woodland Management Concerns--Continued

Soil name and map symbol	Seedling mortality	Plant competition	Limitation for revegetating exposed subsoil with-- Grasses	Trees	Equipment limitation	Hazard of soil damage from-- Fire	Compaction	Hazard of sheet and rill erosion: Bare soil surface	When logs are yarded by-- Tractor	Cable systems
240:										
Yellowhound---------	Moderate	Severe	Slight	Moderate	Moderate	Slight	Moderate	Moderate	Slight	Slight.
Woodin--------------	Severe	Slight	Severe	Severe	Moderate	Moderate	Slight	Moderate	Slight	Slight.
Ornbaun-------------	Slight	Severe	Slight	Slight	Moderate	Slight	Moderate	Severe	Slight	Slight.
241:										
Yorkville.										
Hopland-------------	Moderate	Moderate	Slight	Moderate	Moderate	Slight	Moderate	Severe	Moderate	Moderate.
244:										
Yorkville.										
Yorktree------------	Moderate	Severe	Slight	Moderate	Moderate	Slight	Moderate	Moderate	Slight	---
Squawrock.										
245:										
Yorkville.										
Yorktree------------	Moderate	Severe	Slight	Moderate	Severe	Slight	Moderate	Severe	Slight	Slight.
Squawrock.										

* The less steep areas may be rated "slight" for erosion hazard where the surface is bare.

** Because of the variability of soil properties, the actual rating includes parts of two classes. The more restrictive rating is listed.

Table 7.--Recreational Development

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
101, 102:					
Abalobadiah	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Bruhel	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Vizcaino	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.
103:					
Bearwallow	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Moderate: dusty.	Moderate: slope, depth to rock.
Wolfey	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Moderate: dusty.	Severe: depth to rock.
104:					
Bearwallow	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.	Severe: slope.
Wolfey	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope, dusty.	Severe: slope, depth to rock.
105 Biaggi	Slight	Slight	Moderate: slope, small stones, depth to rock.	Slight	Moderate: depth to rock.
106 Biaggi	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, depth to rock.
107 Bigriver	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
108:					
Blacklock	Severe: wetness, cemented pan, too acid.	Severe: wetness, too acid, cemented pan.	Severe: wetness, cemented pan, too acid.	Severe: wetness.	Severe: too acid, wetness, droughty.
Aborigine	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
109 Boontling	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Moderate: dusty.	Slight.

Table 7.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
110------------------- Boontling	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Moderate: dusty.	Moderate: slope.
111------------------- Boontling	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.	Severe: slope.
112, 113:					
Branscomb------------	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.	Severe: small stones, slope.
Usal-----------------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
114------------------- Bruhel	Slight----------	Slight----------	Moderate: slope, small stones.	Slight----------	Slight.
115:					
Bruhel---------------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Abalobadiah----------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Vizcaino-------------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.	Severe: slope, depth to rock.
116:					
Bruhel---------------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
Shinglemill----------	Severe: wetness, too acid.	Severe: too acid.	Severe: slope, wetness, too acid.	Moderate: wetness.	Severe: too acid.
117:					
Cabrillo-------------	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
Heeser---------------	Slight----------	Slight----------	Moderate: slope.	Slight----------	Moderate: droughty.
118------------------- Carlain	Slight----------	Slight----------	Moderate: slope, small stones.	Slight----------	Slight.
119:					
Casabonne------------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.	Severe: slope.
Wohly----------------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.	Severe: slope.

Table 7.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
120:					
Casabonne	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Wohly	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
121:					
Casabonne	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Wohly	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Pardaloe	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.	Severe: small stones, slope.
122 Caspar	Slight	Slight	Moderate: slope.	Slight	Slight.
123:					
Caspar	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Quinliven	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
124:					
Caspar	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Quinliven	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Ferncreek	Severe: slope, too acid.	Severe: slope, too acid.	Severe: slope, too acid.	Moderate: slope.	Severe: too acid, slope.
125 Cleone	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
126. Coastal beaches					
127 Cole	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Moderate: dusty.	Slight.
128 Cole	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Slight.
129, 130:					
Comptche	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.

Table 7.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
129, 130:					
Zeni	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
131 Cottoneva	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
132 Crispin	Slight	Slight	Moderate: slope, depth to rock.	Slight	Moderate: depth to rock.
133:					
Dann	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.
Hiltabidel	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: large stones, slope.	Severe: large stones, droughty, slope.
134:					
Dann	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.	Severe: large stones.	Severe: large stones, slope.
Littlered	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Hiltabidel	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: large stones.	Severe: large stones, droughty, slope.
135, 136:					
Dehaven	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Hotel	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.	Severe: small stones, slope.
137:					
Dehaven	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Hotel	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.	Severe: small stones, slope.
Irmulco	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
138. Duneland					
139. Dystropepts					

Table 7.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
140 Feliz	Severe: flooding.	Moderate: dusty.	Moderate: slope, small stones, dusty.	Moderate: dusty.	Slight.
141 Ferncreek	Severe: too acid.	Severe: too acid.	Severe: too acid.	Slight	Severe: too acid.
142:					
Fishrock	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.	Severe: depth to rock.
Iversen	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, depth to rock.
143:					
Fishrock	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.	Severe: slope, depth to rock.
Iversen	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
144 Flumeville	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
145 Flumeville	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: slope, wetness, percs slowly.	Moderate: wetness.	Moderate: wetness, slope.
146:					
Garcia	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Snook	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.
Gube	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
147:					
Gibney	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: slope.
Gibwell	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: slope.
148 Gibwell	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight	Slight.

Table 7.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
149 Gibwell	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: slope.
150 Glenblair	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
151, 152 Glenblair	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
153:					
Gschwend	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
Frenchman	Severe: small stones.	Severe: small stones.	Severe: small stones.	Slight	Severe: small stones.
154:					
Gube	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Garcia	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Snook	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.
155:					
Haploxeralfs.					
Argixerolls.					
156:					
Haploxeralfs, wet.					
Argixerolls.					
157 Harecreek	Slight	Slight	Moderate: slope.	Slight	Slight.
158 Havensneck	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, depth to rock.
159 Havensneck	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
160:					
Havensneck	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Seaside	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.	Severe: slope, depth to rock.

Table 7.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
161------------------- Heeser	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: droughty, slope.
162:					
Hiltabidel-----------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: large stones, slope.	Severe: large stones, droughty, slope.
Dann-----------------	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.
163:					
Holohan--------------	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, droughty, slope.
Hollowtree-----------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
164:					
Holohan--------------	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones, droughty, slope.
Hollowtree-----------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
Casabonne------------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, dusty.	Severe: slope.
165:					
Holohan--------------	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, droughty, slope.
Hollowtree-----------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Casabonne------------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
166, 167-------------- Hopland	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
168:					
Hopland--------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

Table 7.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
168:					
Squawrock	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
169:					
Hopland	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Witherell	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.
Squawrock	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
170, 171:					
Hopland	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Wohly	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
172:					
Irmulco	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Tramway	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
173, 174:					
Irmulco	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Tramway	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
175 Iversen	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, depth to rock.
176 Iversen	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
177 Iversen	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, depth to rock.
178:					
Kibesillah	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.	Severe: small stones, slope.
Yellowhound	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
179 Littlered	Slight	Slight	Moderate: slope.	Slight	Moderate: large stones.

Table 7.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
180: Mackerricher	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
181: Mackerricher	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
182: Mallopass	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
183: Mallopass	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
184: Mallopass	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
185:					
Maymen	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.
Etsel	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.	Severe: droughty, slope.
Snook	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.
186:					
Maymen	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.
Woodin	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, slope.
Etsel	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.	Severe: droughty, slope.
187:					
Ornbaun	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Zeni	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
188, 189:					
Ornbaun	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Zeni	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

Table 7.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
190:					
Pardaloe-------------	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.	Severe: small stones, slope.
Woodin---------------	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, slope.
191:					
Pardaloe-------------	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.	Severe: small stones, slope.
Woodin---------------	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, slope.
Casabonne------------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
192------------------- Perrygulch	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
193------------------- Pinole	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones, dusty.	Moderate: dusty.	Slight.
194------------------- Pinole	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Moderate: dusty.	Moderate: slope.
195:					
Pits.					
Dumps.					
196:					
Quinliven------------	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Ferncreek------------	Severe: too acid.	Severe: too acid.	Severe: slope, too acid.	Slight----------	Severe: too acid.
197. Riverwash					
198:					
Seaside--------------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.	Severe: slope, depth to rock.
Rock outcrop.					

Table 7.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
199:					
Shinglemill	Severe: wetness, too acid.	Severe: too acid.	Severe: wetness, too acid.	Moderate: wetness.	Severe: too acid.
Gibney	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, percs slowly.	Slight	Slight.
200:					
Shortyork	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Tyson	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Witherell	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.
201:					
Shortyork	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Moderate: dusty.	Moderate: droughty, slope, depth to rock.
Yorkville	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: slope.
Witherell	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Moderate: dusty.	Severe: depth to rock.
202:					
Shortyork	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.	Severe: slope.
Yorkville	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Witherell	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope, dusty.	Severe: slope, depth to rock.
203:					
Shortyork	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Yorkville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Witherell	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.

Table 7.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
204------------------- Sirdrak	Moderate: slope, too sandy.	Moderate: slope, too sandy.	Severe: slope.	Moderate: too sandy.	Moderate: droughty, slope.
205, 206:					
Squawrock------------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Garcia---------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Witherell------------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.
207, 208:					
Squawrock------------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Witherell------------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.
209------------------- Stornetta	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
210------------------- Talmage	Severe: flooding.	Moderate: small stones, dusty.	Severe: small stones.	Moderate: dusty.	Severe: droughty.
211:					
Threechop------------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Ornbaun--------------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
212:					
Tregoning------------	Severe: wetness, too acid.	Severe: too acid.	Severe: wetness, too acid.	Moderate: wetness.	Severe: too acid.
Cleone---------------	Slight----------	Slight----------	Moderate: slope.	Slight----------	Moderate: droughty.
213:					
Tregoning------------	Severe: wetness, too acid.	Severe: too acid.	Severe: slope, wetness, too acid.	Moderate: wetness.	Severe: too acid.
Cleone---------------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: droughty, slope.
214. Tropaquepts					

Table 7.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
215:					
Tyson	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, dusty.	Severe: slope.
Updegraff	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.	Severe: slope.
216:					
Tyson	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Updegraff	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
217 Updegraff	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
218:					
Updegraff	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Hopland	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Woodin	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, slope.
219. Urban land					
220:					
Usal	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Branscomb	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.	Severe: small stones, slope.
221 Vandamme	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
222:					
Vandamme	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: slope.
Caspar	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
223:					
Vandamme	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Irmulco	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

Table 7.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
224:					
Vandamme	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Irmulco	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Tramway	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
225 Windyhollow	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
226 Windyhollow	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
227 Windyhollow	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
228:					
Witherell	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.
Hopland	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Squawrock	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
229, 230:					
Wolfey	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.
Bearwallow	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
231, 232:					
Woodin	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, slope.
Yellowhound	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
233, 234:					
Xerochrepts.					
Haploxeralfs.					
Argixerolls.					
235:					
Yellowhound	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.

Table 7.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
235:					
Kibesillah	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.	Severe: small stones, slope.
236:					
Yellowhound	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Kibesillah	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Moderate: slope.	Severe: small stones, slope.
Ornbaun	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
237:					
Yellowhound	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Kibesillah	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.	Severe: small stones, slope.
Ornbaun	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
238:					
Yellowhound	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Woodin	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, slope.
239:					
Yellowhound	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Woodin	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
Ornbaun	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
240:					
Yellowhound	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Woodin	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, slope.
Ornbaun	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

Table 7.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
241:					
Yorkville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Hopland	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
242:					
Yorkville	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Squawrock	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, dusty.	Severe: slope.
Witherell	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope, dusty.	Severe: slope, depth to rock.
243:					
Yorkville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Squawrock	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Witherell	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.
244:					
Yorkville	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Yorktree	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.	Severe: slope.
Squawrock	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, dusty.	Severe: slope.
245:					
Yorkville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Yorktree	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Squawrock	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.

Table 8.--Building Site Development

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
101, 102:						
Abalobadiah	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Bruhel	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Vizcaino	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.
103:						
Bearwallow	Moderate: depth to rock, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Moderate: shrink-swell, low strength, slope.	Moderate: slope, depth to rock.
Wolfey	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope.	Severe: depth to rock.
104:						
Bearwallow	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Wolfey	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.
105 Biaggi	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: depth to rock.	Moderate: depth to rock.	Moderate: depth to rock.
106 Biaggi	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock.	Moderate: slope, depth to rock.
107 Bigriver	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
108:						
Blacklock	Severe: cemented pan, wetness.	Severe: wetness, cemented pan.	Severe: wetness, cemented pan.	Severe: wetness, cemented pan.	Severe: cemented pan, wetness.	Severe: too acid, wetness, droughty.
Aborigine	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness.	Severe: wetness.
109 Boontling	Moderate: too clayey, wetness.	Slight	Moderate: wetness, shrink-swell.	Moderate: slope.	Slight	Slight.

Table 8.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
110 Boontling	Moderate: too clayey, wetness, slope.	Moderate: slope.	Moderate: wetness, slope, shrink-swell.	Severe: slope.	Moderate: slope.	Moderate: slope.
111 Boontling	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
112, 113:						
Branscomb	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
Usal	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
114 Bruhel	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell.	Slight.
115:						
Bruhel	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Abalobadiah	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Vizcaino	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.
116:						
Bruhel	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: shrink-swell, slope.	Moderate: slope.
Shinglemill	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, slope.	Severe: low strength.	Severe: too acid.
117:						
Cabrillo	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Slight.
Heeser	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Moderate: droughty.
118 Carlain	Slight	Moderate: shrink-swell.	Slight	Moderate: shrink-swell, slope.	Moderate: shrink-swell.	Slight.
119, 120:						
Casabonne	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Wohly	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

Table 8.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
121:						
Casabonne	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Wohly	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Pardaloe	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
122 Caspar	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell.	Slight.
123:						
Caspar	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Quinliven	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
124:						
Caspar	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Quinliven	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Ferncreek	Severe: wetness, slope.	Severe: slope.	Severe: wetness, slope.	Severe: slope.	Severe: low strength, slope.	Severe: too acid, slope.
125 Cleone	Severe: cutbanks cave.	Slight	Moderate: wetness.	Moderate: slope.	Slight	Moderate: droughty.
126. Coastal beaches						
127 Cole	Moderate: too clayey, wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
128 Cole	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
129, 130:						
Comptche	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Zeni	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
131 Cottoneva	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.

Table 8.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
132 Crispin	Moderate: depth to rock.	Slight	Moderate: depth to rock.	Slight	Slight	Moderate: depth to rock.
133:						
Dann	Severe: depth to rock, large stones, slope.	Severe: slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope, large stones.	Severe: low strength, slope, large stones.	Severe: large stones, slope.
Hiltabidel	Severe: depth to rock, large stones, slope.	Severe: slope, depth to rock, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope, depth to rock, large stones.	Severe: depth to rock, slope, large stones.	Severe: large stones, droughty, slope.
134:						
Dann	Severe: depth to rock, large stones, slope.	Severe: slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope, large stones.	Severe: low strength, slope, large stones.	Severe: large stones, slope.
Littlered	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Hiltabidel	Severe: depth to rock, large stones, slope.	Severe: slope, depth to rock, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope, depth to rock, large stones.	Severe: depth to rock, slope, large stones.	Severe: large stones, droughty, slope.
135, 136:						
Dehaven	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Hotel	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
137:						
Dehaven	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Hotel	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
Irmulco	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
138. Duneland						
139. Dystropepts						
140 Feliz	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: shrink-swell, low strength, flooding.	Slight.

Table 8.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
141----------- Ferncreek	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength.	Severe: too acid.
142:						
Fishrock---------	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, low strength.	Severe: depth to rock.
Iversen----------	Moderate: depth to rock, too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope, depth to rock.
143:						
Fishrock---------	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, low strength, slope.	Severe: slope, depth to rock.
Iversen----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
144----------- Flumeville	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength.	Moderate: wetness.
145----------- Flumeville	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: wetness, slope.
146:						
Garcia-----------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Snook------------	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.
Gube-------------	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope.
147:						
Gibney-----------	Moderate: too clayey, wetness, slope.	Moderate: shrink-swell, slope.	Moderate: wetness, slope, shrink-swell.	Severe: slope.	Moderate: shrink-swell, slope.	Moderate: slope.
Gibwell----------	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
148----------- Gibwell	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Slight---------	Slight.

Table 8.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
149 Gibwell	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
150, 151, 152 Glenblair	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
153:						
Gschwend	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Slight.
Frenchman	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Severe: small stones.
154:						
Gube	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope.
Garcia	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Snook	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.
155:						
Haploxeralfs.						
Argixerolls.						
156:						
Haploxeralfs, wet.						
Argixerolls.						
157 Harecreek	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Slight.
158 Havensneck	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope.	Moderate: slope, depth to rock.
159 Havensneck	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
160:						
Havensneck	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Seaside	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.
161 Heeser	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.

Table 8.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
162:						
Hiltabidel	Severe: depth to rock, large stones, slope.	Severe: slope, depth to rock, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope, depth to rock, large stones.	Severe: depth to rock, slope, large stones.	Severe: large stones, droughty, slope.
Dann	Severe: depth to rock, large stones, slope.	Severe: slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope, large stones.	Severe: low strength, slope, large stones.	Severe: large stones, slope.
163:						
Holohan	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, droughty, slope.
Hollowtree	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
164, 165:						
Holohan	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, droughty, slope.
Hollowtree	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Casabonne	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
166, 167 Hopland	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
168:						
Hopland	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Squawrock	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
169:						
Hopland	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Witherell	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.
Squawrock	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
170, 171:						
Hopland	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

Table 8.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
170, 171:						
Wohly	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
172, 173, 174:						
Irmulco	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Tramway	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
175 Iversen	Moderate: depth to rock, too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope, depth to rock.
176 Iversen	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
177 Iversen	Moderate: depth to rock, too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope, depth to rock.
178:						
Kibesillah	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
Yellowhound	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
179 Littlered	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: large stones.
180 Mackerricher	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
181 Mackerricher	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
182 Mallopass	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.	Slight.
183 Mallopass	Moderate: wetness, slope.	Moderate: shrink-swell, slope.	Moderate: wetness, slope, shrink-swell.	Severe: slope.	Moderate: shrink-swell, low strength, slope.	Moderate: slope.
184 Mallopass	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
185:						
Maymen	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.

Table 8.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
185:						
Etsel	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: droughty, slope.
Snook	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.
186:						
Maymen	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.
Woodin	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
Etsel	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: droughty, slope.
187, 188, 189:						
Ornbaun	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Zeni	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
190:						
Pardaloe	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
Woodin	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
191:						
Pardaloe	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
Woodin	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
Casabonne	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
192 Perrygulch	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.	Severe: wetness.
193 Pinole	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell.	Slight.

Table 8.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
194-------------- Pinole	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: shrink-swell, slope.	Moderate: slope.
195: Pits.						
Dumps.						
196: Quinliven--------	Moderate: too clayey, wetness, slope.	Moderate: shrink-swell, slope.	Moderate: wetness, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
Ferncreek--------	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: wetness.	Severe: slope.	Severe: low strength.	Severe: too acid.
197. Riverwash						
198: Seaside----------	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.
Rock outcrop.						
199: Shinglemill------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength.	Severe: too acid.
Gibney-----------	Moderate: too clayey, wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell.	Slight.
200: Shortyork--------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Tyson------------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Witherell--------	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.
201: Shortyork--------	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, shrink-swell, slope.	Moderate: droughty, slope, depth to rock.
Yorkville--------	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: slope.

Table 8.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
201:						
Witherell	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.
202, 203:						
Shortyork	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Yorkville	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope.
Witherell	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.
204 Sirdrak	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
205, 206:						
Squawrock	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Garcia	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Witherell	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.
207, 208:						
Squawrock	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Witherell	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.
209 Stornetta	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
210 Talmage	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Severe: droughty.
211:						
Threechop	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Ornbaun	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

Table 8.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
212:						
Tregoning	Severe: cemented pan, cutbanks cave, wetness.	Severe: wetness.	Severe: wetness, cemented pan.	Severe: wetness.	Moderate: cemented pan, wetness.	Severe: too acid.
Cleone	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Moderate: droughty.
213:						
Tregoning	Severe: cemented pan, cutbanks cave, wetness.	Severe: wetness.	Severe: wetness, cemented pan.	Severe: wetness, slope.	Moderate: cemented pan, wetness, slope.	Severe: too acid.
Cleone	Severe: cutbanks cave.	Moderate: slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
214. Tropaquepts						
215, 216:						
Tyson	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Updegraff	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
217 Updegraff	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
218:						
Updegraff	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Hopland	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Woodin	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
219. Urban land						
220:						
Usal	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Branscomb	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.

Table 8.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
221--------------- Vandamme	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
222:						
Vandamme---------	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
Caspar-----------	Severe: cutbanks cave.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: shrink-swell, slope.	Moderate: slope.
223:						
Vandamme---------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Irmulco----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
224:						
Vandamme---------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Irmulco----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Tramway----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
225--------------- Windyhollow	Moderate: too clayey, wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Slight.
226--------------- Windyhollow	Moderate: too clayey, wetness, slope.	Moderate: shrink-swell, slope.	Moderate: wetness, slope, shrink-swell.	Severe: slope.	Moderate: shrink-swell, slope.	Moderate: slope.
227--------------- Windyhollow	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
228:						
Witherell--------	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.
Hopland----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Squawrock--------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
229, 230:						
Wolfey-----------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.

Table 8.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
229, 230:						
Bearwallow-------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
231, 232:						
Woodin-----------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
Yellowhound------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
233, 234:						
Xerochrepts.						
Haploxeralfs.						
Argixerolls.						
235:						
Yellowhound------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Kibesillah-------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
236, 237:						
Yellowhound------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Kibesillah-------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
Ornbaun----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
238:						
Yellowhound------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Woodin-----------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
239:						
Yellowhound------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Woodin-----------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ornbaun----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
240:						
Yellowhound------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

Table 8.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
240:						
Woodin----------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
Ornbaun---------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
241:						
Yorkville--------	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope.
Hopland---------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
242, 243:						
Yorkville--------	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope.
Squawrock--------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Witherell--------	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.
244, 245:						
Yorkville--------	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope.
Yorktree---------	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope.
Squawrock--------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.

Table 9.--Sanitary Facilities

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
101, 102:					
Abalobadiah	Severe: slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Poor: slope, depth to rock.
Bruhel	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope.
Vizcaino	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
103:					
Bearwallow	Severe: percs slowly, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
Wolfey	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
104:					
Bearwallow	Severe: percs slowly, slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
Wolfey	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
105 Biaggi	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
106 Biaggi	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
107 Bigriver	Severe: flooding.	Severe: flooding, seepage.	Severe: flooding, seepage.	Severe: flooding, seepage.	Fair: too sandy.
108:					
Blacklock	Severe: cemented pan, wetness.	Severe: cemented pan, seepage.	Severe: cemented pan, seepage, wetness.	Severe: cemented pan, wetness.	Poor: cemented pan, seepage, wetness.
Aborigine	Severe: percs slowly, wetness.	Moderate: seepage, slope.	Severe: too clayey, wetness.	Severe: wetness.	Poor: hard to pack, too clayey, wetness.
109 Boontling	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: small stones.

Table 9.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
110-------------- Boontling	Severe: percs slowly, wetness.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.	Poor: small stones.
111-------------- Boontling	Severe: percs slowly, slope, wetness.	Severe: slope, wetness.	Severe: slope, wetness.	Severe: slope, wetness.	Poor: slope, small stones.
112, 113:					
Branscomb-------	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, small stones.
Usal------------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
114-------------- Bruhel	Moderate: percs slowly, depth to rock.	Moderate: seepage, slope, depth to rock.	Severe: depth to rock.	Moderate: depth to rock.	Fair: small stones, too clayey, depth to rock.
115:					
Bruhel----------	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope.
Abalobadiah-----	Severe: slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Poor: slope, depth to rock.
Vizcaino--------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
116:					
Bruhel----------	Moderate: percs slowly, slope, depth to rock.	Severe: slope.	Severe: depth to rock.	Moderate: slope, depth to rock.	Fair: small stones, too clayey, depth to rock.
Shinglemill-----	Severe: percs slowly, wetness.	Severe: slope.	Severe: too clayey, wetness, too acid.	Severe: wetness.	Poor: hard to pack, too clayey, wetness.
117:					
Cabrillo--------	Severe: percs slowly, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Fair: wetness.
Heeser----------	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy.
118-------------- Carlain	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: small stones.
119, 120:					
Casabonne-------	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope.

Table 9.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
119, 120:					
Wohly	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
121:					
Casabonne	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope.
Wohly	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
Pardaloe	Severe: slope.	Severe: seepage, slope.	Severe: slope, depth to rock.	Severe: seepage, slope.	Poor: seepage slope, small stones
122 Caspar	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Slight	Good.
123:					
Caspar	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Poor: slope.
Quinliven	Severe: percs slowly, slope.	Severe: slope.	Severe: seepage, slope, too clayey.	Severe: slope.	Poor: hard to pack, slope, too clayey.
124:					
Caspar	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Poor: slope.
Quinliven	Severe: percs slowly, slope.	Severe: slope.	Severe: seepage, slope, too clayey.	Severe: slope.	Poor: hard to pack, slope, too clayey.
Ferncreek	Severe: percs slowly, slope, wetness.	Severe: slope.	Severe: slope, too clayey, wetness.	Severe: slope, wetness.	Poor: hard to pack, slope, too clayey.
125 Cleone	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Fair: thin layer, too sandy, wetness.
126. Coastal beaches					
127 Cole	Severe: percs slowly, wetness.	Moderate: seepage, slope.	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey.
128 Cole	Severe: percs slowly.	Moderate: seepage.	Severe: too clayey.	Slight	Poor: too clayey.

Table 9.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
129, 130:					
Comptche	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey, depth to rock.	Severe: slope.	Poor: slope, small stones, too clayey.
Zeni	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
131 Cottoneva	Severe: flooding, percs slowly, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: wetness.
132 Crispin	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
133:					
Dann	Severe: percs slowly, slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: slope, too clayey, depth to rock.	Severe: slope, depth to rock.	Poor: large stones, too clayey, depth to rock.
Hiltabidel	Severe: large stones, slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: slope, depth to rock.	Poor: large stones, slope, depth to rock.
134:					
Dann	Severe: percs slowly, slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: slope, too clayey, depth to rock.	Severe: slope, depth to rock.	Poor: large stones, too clayey, depth to rock.
Littlered	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Hiltabidel	Severe: large stones, slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: slope, depth to rock.	Poor: large stones, slope, depth to rock.
135, 136:					
Dehaven	Severe: slope.	Severe: seepage, slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, small stones.
Hotel	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, small stones, depth to rock.
137:					
Dehaven	Severe: slope.	Severe: seepage, slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, small stones.
Hotel	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, small stones, depth to rock.

Table 9.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
137:					
Irmulco	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope.
138. Duneland					
139. Dystropepts					
140 Feliz	Moderate: flooding, percs slowly.	Moderate: seepage, slope.	Moderate: flooding, too clayey.	Moderate: flooding.	Fair: too clayey.
141 Ferncreek	Severe: percs slowly, wetness.	Moderate: seepage, slope.	Severe: too clayey, wetness, too acid.	Severe: wetness.	Poor: hard to pack, too clayey, too acid.
142:					
Fishrock	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: too clayey, depth to rock.	Severe: depth to rock.	Poor: too clayey, depth to rock.
Iversen	Severe: percs slowly, depth to rock.	Severe: slope, depth to rock.	Severe: too clayey, depth to rock.	Severe: depth to rock.	Poor: hard to pack, too clayey, depth to rock.
143:					
Fishrock	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, too clayey, depth to rock.	Severe: slope, depth to rock.	Poor: slope, too clayey, depth to rock.
Iversen	Severe: percs slowly, slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, too clayey, depth to rock.	Severe: slope, depth to rock.	Poor: hard to pack, too clayey, depth to rock.
144 Flumeville	Severe: percs slowly, wetness.	Moderate: slope.	Severe: too clayey, wetness.	Severe: wetness.	Poor: hard to pack, too clayey, wetness.
145 Flumeville	Severe: percs slowly, wetness.	Severe: slope.	Severe: too clayey, wetness.	Severe: wetness.	Poor: hard to pack, too clayey, wetness.
146:					
Garcia	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
Snook	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
Gube	Severe: percs slowly, slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, too clayey, depth to rock.	Severe: slope, depth to rock.	Poor: hard to pack, too clayey, depth to rock.

Table 9.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
147:					
Gibney	Severe: percs slowly, wetness.	Severe: slope.	Severe: too clayey, wetness, too acid.	Severe: wetness.	Poor: hard to pack, too clayey, too acid.
Gibwell	Severe: percs slowly.	Severe: seepage, slope.	Severe: seepage, too sandy.	Moderate: slope.	Poor: too sandy.
148 Gibwell	Severe: percs slowly.	Severe: seepage.	Severe: seepage, too sandy.	Slight	Poor: too sandy.
149 Gibwell	Severe: percs slowly.	Severe: seepage, slope.	Severe: seepage, too sandy.	Moderate: slope.	Poor: too sandy.
150, 151, 152 Glenblair	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, small stones.
153:					
Gschwend	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: small stones.
Frenchman	Severe: poor filter.	Severe: seepage,	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, small stones, too sandy.
154:					
Gube	Severe: percs slowly, slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, too clayey, depth to rock.	Severe: slope, depth to rock.	Poor: hard to pack, too clayey, depth to rock.
Garcia	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
Snook	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
155:					
Haploxeralfs.					
Argixerolls.					
156:					
Haploxeralfs, wet.					
Argixerolls.					
157 Harecreek	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: thin layer.
158 Havensneck	Severe: depth to rock.	Severe: seepage, slope, depth to rock.	Severe: depth to rock.	Severe: seepage, depth to rock.	Poor: depth to rock.

Table 9.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
159------------- Havensneck	Severe: slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: slope, depth to rock.	Severe: seepage, slope, depth to rock.	Poor: slope, depth to rock.
160:					
Havensneck------	Severe: slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: slope, depth to rock.	Severe: seepage, slope, depth to rock.	Poor: slope, depth to rock.
Seaside---------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
161------------- Heeser	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy.
162:					
Hiltabidel------	Severe: large stones, slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: slope, depth to rock.	Poor: large stones, slope, depth to rock.
Dann------------	Severe: percs slowly, slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: slope, too clayey, depth to rock.	Severe: slope, depth to rock.	Poor: large stones, too clayey, depth to rock.
163:					
Holohan---------	Severe: slope, poor filter.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: seepage, slope, small stones.
Hollowtree------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, small stones, depth to rock.
164, 165:					
Holohan---------	Severe: slope, poor filter.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: seepage, slope, small stones.
Hollowtree------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, small stones, depth to rock.
Casabonne-------	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope.
166, 167--------- Hopland	Severe: percs slowly, slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.

Table 9.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
168:					
Hopland	Severe: percs slowly, slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
Squawrock	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: large stones, slope, depth to rock.
169:					
Hopland	Severe: percs slowly, slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
Witherell	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
Squawrock	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, small stones, depth to rock.
170, 171:					
Hopland	Severe: percs slowly, slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
Wohly	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
172, 173, 174:					
Irmulco	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope.
Tramway	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
175 Iversen	Severe: percs slowly, depth to rock.	Severe: slope, depth to rock.	Severe: too clayey, depth to rock.	Severe: depth to rock.	Poor: hard to pack, too clayey, depth to rock.
176 Iversen	Severe: percs slowly, slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, too clayey, depth to rock.	Severe: slope, depth to rock.	Poor: hard to pack, too clayey, depth to rock.
177 Iversen	Severe: percs slowly, depth to rock.	Severe: slope, depth to rock.	Severe: too clayey, depth to rock.	Severe: depth to rock.	Poor: hard to pack, too clayey, depth to rock.

Table 9.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
178:					
Kibesillah	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, small stones, depth to rock.
Yellowhound	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, small stones.
179 Littlered	Moderate: percs slowly.	Moderate: large stones, seepage, slope.	Moderate: large stones, too clayey.	Slight	Fair: large stones, too clayey.
180 Mackerricher	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy.
181 Mackerricher	Severe: slope, poor filter.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: slope, too sandy.
182 Mallopass	Severe: percs slowly.	Severe: seepage.	Severe: wetness.	Moderate: wetness.	Fair: small stones, too clayey.
183 Mallopass	Severe: percs slowly.	Severe: seepage, slope.	Severe: wetness.	Moderate: slope, wetness.	Fair: slope, small stones, too clayey.
184 Mallopass	Severe: percs slowly, slope.	Severe: seepage, slope.	Severe: slope, wetness.	Severe: slope.	Poor: slope.
185:					
Maymen	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
Etsel	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, small stones, depth to rock.
Snook	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
186:					
Maymen	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
Woodin	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, small stones, depth to rock.

Table 9.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
186:					
Etsel	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, small stones, depth to rock.
187, 188, 189:					
Ornbaun	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope.
Zeni	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
190:					
Pardaloe	Severe: slope.	Severe: seepage, slope.	Severe: slope, depth to rock.	Severe: seepage, slope.	Poor: seepage, slope, small stones, depth to rock.
Woodin	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, small stones, depth to rock.
191:					
Pardaloe	Severe: slope.	Severe: seepage, slope.	Severe: slope, depth to rock.	Severe: seepage, slope.	Poor: seepage, slope, small stones.
Woodin	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, small stones, depth to rock.
Casabonne	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope.
192 Perrygulch	Severe: percs slowly, wetness.	Moderate: slope.	Severe: too clayey, wetness.	Severe: wetness.	Poor: hard to pack, too clayey, wetness.
193 Pinole	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
194 Pinole	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: slope, too clayey.
195:					
Pits and Dumps					
196:					
Quinliven	Severe: percs slowly.	Severe: slope.	Severe: seepage, too clayey, too acid.	Moderate: slope.	Poor: hard to pack, too clayey, too acid.

Table 9.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
196:					
Ferncreek-------	Severe: percs slowly, wetness.	Severe: slope.	Severe: too clayey, wetness, too acid.	Severe: wetness.	Poor: hard to pack, too clayey, too acid.
197. Riverwash					
198:					
Seaside---------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
Rock outcrop.					
199:					
Shinglemill-----	Severe: percs slowly, wetness.	Moderate: slope.	Severe: too clayey, wetness, too acid.	Severe: wetness.	Poor: hard to pack, too clayey, wetness.
Gibney----------	Severe: percs slowly, wetness.	Moderate: slope.	Severe: too clayey, wetness, too acid.	Severe: wetness.	Poor: hard to pack, too clayey, too acid.
200:					
Shortyork-------	Severe: slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Poor: slope, small stones, depth to rock.
Tyson-----------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, small stones, depth to rock.
Witherell-------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
201:					
Shortyork-------	Severe: depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, depth to rock.	Severe: seepage, depth to rock.	Poor: small stones, depth to rock.
Yorkville-------	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: hard to pack, too clayey.
Witherell-------	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
202, 203:					
Shortyork-------	Severe: slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Poor: slope, small stones, depth to rock.

Table 9.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
202, 203:					
Yorkville	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: hard to pack, slope, too clayey.
Witherell	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
204 Sirdrak	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
205, 206:					
Squawrock	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, small stones, depth to rock.
Garcia	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
Witherell	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
207, 208:					
Squawrock	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, small stones, depth to rock.
Witherell	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
209 Stornetta	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
210 Talmage	Moderate: flooding.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: seepage, small stones.
211:					
Threechop	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey, depth to rock.	Severe: slope.	Poor: hard to pack, slope, too clayey.
Ornbaun	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope.
212:					
Tregoning	Severe: cemented pan, wetness.	Severe: cemented pan, seepage, wetness.	Severe: cemented pan, seepage, wetness.	Severe: cemented pan, seepage, wetness.	Poor: cemented pan, wetness, too acid.

Table 9.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
212:					
Cleone----------	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Fair: thin layer, too sandy, wetness.
213:					
Tregoning-------	Severe: cemented pan, wetness.	Severe: cemented pan, seepage, slope.	Severe: cemented pan, seepage, wetness.	Severe: cemented pan, seepage, wetness.	Poor: cemented pan, wetness, too acid.
Cleone----------	Severe: wetness.	Severe: seepage, slope, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Fair: slope, too sandy, wetness.
214. Tropaquepts					
215, 216:					
Tyson-----------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, small stones, depth to rock.
Updegraff-------	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope.
217------------- Updegraff	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope.
218:					
Updegraff-------	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope.
Hopland---------	Severe: percs slowly, slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
Woodin----------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, small stones, depth to rock.
219. Urban land					
220:					
Usal------------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
Branscomb-------	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, small stones.

Table 9.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
221------------- Vandamme	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey, depth to rock.	Severe: slope.	Poor: hard to pack, slope, too clayey.
222:					
Vandamme--------	Severe: percs slowly.	Severe: slope.	Severe: too clayey, depth to rock.	Moderate: slope, depth to rock.	Poor: hard to pack, too clayey.
Caspar----------	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Moderate: slope.	Fair: slope.
223:					
Vandamme--------	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey, depth to rock.	Severe: slope.	Poor: hard to pack, slope, too clayey.
Irmulco---------	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope.
224:					
Vandamme--------	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey, depth to rock.	Severe: slope.	Poor: hard to pack, slope, too clayey.
Irmulco---------	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope.
Tramway---------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
225------------- Windyhollow	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: small stones, too clayey, wetness.
226------------- Windyhollow	Severe: percs slowly, wetness.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.	Fair: slope, small stones, too clayey.
227------------- Windyhollow	Severe: percs slowly, slope, wetness.	Severe: slope, wetness.	Severe: slope, wetness.	Severe: slope, wetness.	Poor: slope.
228:					
Witherell-------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
Hopland---------	Severe: percs slowly, slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.

Table 9.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
228:					
Squawrock-------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, small stones, depth to rock.
229, 230:					
Wolfey----------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
Bearwallow------	Severe: percs slowly, slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
231, 232:					
Woodin----------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, small stones, depth to rock.
Yellowhound-----	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, small stones.
233, 234:					
Xerochrepts.					
Haploxeralfs.					
Argixerolls.					
235:					
Yellowhound-----	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, small stones.
Kibesillah------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, small stones, depth to rock.
236, 237:					
Yellowhound-----	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, small stones.
Kibesillah------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, small stones, depth to rock.
Ornbaun---------	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope.
238:					
Yellowhound-----	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, small stones.

Table 9.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
238:					
Woodin	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, small stones, depth to rock.
239, 240:					
Yellowhound	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, small stones.
Woodin	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, small stones, depth to rock.
Ornbaun	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, depth to rock.
241:					
Yorkville	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: hard to pack, slope, too clayey.
Hopland	Severe: percs slowly, slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
242, 243:					
Yorkville	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: hard to pack, slope, too clayey.
Squawrock	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, small stones, depth to rock.
Witherell	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
244, 245:					
Yorkville	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: hard to pack, slope, too clayey.
Yorktree	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, small stones.
Squawrock	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, small stones, depth to rock.

Table 10.--Construction Materials

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
101, 102:				
Abalobadiah	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Bruhel	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Vizcaino	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
103:				
Bearwallow	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, too clayey, slope.
Wolfey	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.
104:				
Bearwallow	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Wolfey	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
105, 106 Biaggi	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, small stones, thin layer.
107 Bigriver	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy.
108:				
Blacklock	Poor: cemented pan, wetness.	Probable	Improbable: too sandy.	Poor: cemented pan, wetness.
Aborigine	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
109, 110 Boontling	Fair: shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.

Table 10.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
111------------------- Boontling	Fair: shrink-swell, wetness, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
112, 113:				
Branscomb-----------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Usal-----------------	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
114------------------- Bruhel	Fair: depth to rock, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
115:				
Bruhel---------------	Fair: depth to rock, shrink-swell, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Abalobadiah----------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Vizcaino-------------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
116:				
Bruhel---------------	Fair: depth to rock, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Shinglemill----------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, too acid.
117:				
Cabrillo-------------	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
Heeser---------------	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
118------------------- Carlain	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
119:				
Casabonne------------	Fair: depth to rock, shrink-swell, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

Table 10.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
119:				
Wohly	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
120:				
Casabonne	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Wohly	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
121:				
Casabonne	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Wohly	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Pardaloe	Poor: slope.	Improbable: small stones.	Improbable: thin layer.	Poor: small stones, area reclaim, slope.
122 Caspar	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
123:				
Caspar	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Quinliven	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, too acid, slope.
124:				
Caspar	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Quinliven	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, too acid, slope.
Ferncreek	Fair: wetness, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, too acid, slope.
125 Cleone	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy, small stones.

Table 10.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
126. Coastal beaches				
127, 128. Cole	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
129, 130:				
Comptche	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Zeni	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
131. Cottoneva	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
132. Crispin	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, small stones, thin layer.
133:				
Dann	Poor: depth to rock, low strength, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: too clayey, large stones, slope.
Hiltabidel	Poor: depth to rock, large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: depth to rock, large stones, slope.
134:				
Dann	Poor: depth to rock, low strength, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: too clayey, large stones, slope.
Littlered	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, large stones, slope.
Hiltabidel	Poor: depth to rock, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: depth to rock, large stones, slope.
135, 136:				
Dehaven	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Hotel	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

Table 10.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
137:				
Dehaven	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Hotel	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Irmulco	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
138. Duneland				
139. Dystropepts				
140 Feliz	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
141 Ferncreek	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, too acid.
142:				
Fishrock	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.
Iversen	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
143:				
Fishrock	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
Iversen	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.
144, 145 Flumeville	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
146:				
Garcia	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Snook	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.

Table 10.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
146:				
Gube	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
147:				
Gibney	Fair: shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too acid.
Gibwell	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
148, 149 Gibwell	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
150 Glenblair	Fair: depth to rock, shrink-swell, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
151, 152 Glenblair	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
153:				
Gschwend	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Frenchman	Good	Probable	Probable	Poor: small stones, area reclaim.
154:				
Gube	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Garcia	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Snook	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
155:				
Haploxeralfs.				
Argixerolls.				
156:				
Haploxeralfs, wet.				
Argixerolls.				

Table 10.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
157: Harecreek	Good	Probable	Improbable: too sandy.	Fair: too clayey, small stones.
158: Havensneck	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, small stones, slope.
159: Havensneck	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
160:				
Havensneck	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Seaside	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
161: Heeser	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer, slope.
162:				
Hiltabidel	Poor: depth to rock, large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: depth to rock, large stones, slope.
Dann	Poor: depth to rock, low strength, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: too clayey, large stones, slope.
163:				
Holohan	Poor: slope.	Probable	Probable	Poor: small stones, area reclaim, slope.
Hollowtree	Poor: depth to rock, slope.	Improbable: thin layer.	Improbable: thin layer.	Poor: small stones, slope.
164:				
Holohan	Fair: large stones, slope.	Probable	Probable	Poor: small stones, area reclaim, slope.
Hollowtree	Poor: depth to rock.	Improbable: thin layer.	Improbable: thin layer.	Poor: small stones, slope.
Casabonne	Fair: depth to rock, shrink-swell, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

Table 10.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
165:				
Holohan	Poor: slope.	Probable	Probable	Poor: small stones, area reclaim, slope.
Hollowtree	Poor: depth to rock, slope.	Improbable: thin layer.	Improbable: thin layer.	Poor: small stones, slope.
Casabonne	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
166, 167 Hopland	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
168:				
Hopland	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Squawrock	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
169:				
Hopland	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Witherell	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
Squawrock	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
170, 171:				
Hopland	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Wohly	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
172:				
Irmulco	Fair: shrink-swell, thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Tramway	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

Table 10.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
173, 174:				
Irmulco	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Tramway	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
175 Iversen	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
176 Iversen	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.
177 Iversen	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
178:				
Kibesillah	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Yellowhound	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
179 Littlered	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, large stones.
180 Mackerricher	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
181 Mackerricher	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, slope.
182 Mallopass	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
183 Mallopass	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim, slope.
184 Mallopass	Fair: shrink-swell, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
185:				
Maymen	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.

Table 10.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
185:				
Etsel	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
Snook	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
186:				
Maymen	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
Woodin	Poor: depth to rock, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones, slope.
Etsel	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
187:				
Ornbaun	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Zeni	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
188, 189:				
Ornbaun	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Zeni	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
190:				
Pardaloe	Poor: slope.	Improbable: small stones.	Improbable: thin layer.	Poor: small stones, area reclaim, slope.
Woodin	Poor: depth to rock, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones, slope.
191:				
Pardaloe	Poor: slope.	Improbable: small stones.	Improbable: thin layer.	Poor: small stones, area reclaim, slope.
Woodin	Poor: depth to rock, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones, slope.

Table 10.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
191:				
Casabonne	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
192 Perrygulch	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
193 Pinole	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
194 Pinole	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
195:				
Pits.				
Dumps.				
196:				
Quinliven	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, too acid.
Ferncreek	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, too acid.
197.				
Riverwash				
198:				
Seaside	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
Rock outcrop.				
199:				
Shinglemill	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, too acid.
Gibney	Fair: shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too acid.
200:				
Shortyork	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Tyson	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

Table 10.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
200:				
Witherell	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
201:				
Shortyork	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Yorkville	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Witherell	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
202:				
Shortyork	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Yorkville	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Witherell	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
203:				
Shortyork	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Yorkville	Poor: shrink-swell, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Witherell	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
204 Sirdrak	Good	Probable	Improbable: too sandy.	Poor: too sandy.
205, 206:				
Squawrock	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Garcia	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

Table 10.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
205, 206:				
Witherell	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
207, 208:				
Squawrock	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Witherell	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
209 Stornetta	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
210 Talmage	Good	Improbable: small stones.	Probable	Poor: small stones, area reclaim.
211:				
Threechop	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Ornbaun	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
212:				
Tregoning	Poor: cemented pan.	Improbable: excess fines.	Improbable: excess fines.	Poor: too acid.
Cleone	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy, small stones.
213:				
Tregoning	Poor: cemented pan.	Improbable: excess fines.	Improbable: excess fines.	Poor: too acid.
Cleone	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy, small stones, slope.
214. Tropaquepts				
215:				
Tyson	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Updegraff	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

Table 10.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
216:				
Tyson	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Updegraff	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
217 Updegraff	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
218:				
Updegraff	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Hopland	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Woodin	Poor: depth to rock, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones, slope.
219. Urban land				
220:				
Usal	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Branscomb	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
221 Vandamme	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
222:				
Vandamme	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Caspar	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
223:				
Vandamme	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Irmulco	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

Table 10.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
224:				
Vandamme	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Irmulco	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Tramway	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
225, 226 Windyhollow	Fair: shrink-swell, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
227 Windyhollow	Fair: shrink-swell, thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
228:				
Witherell	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
Hopland	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Squawrock	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
229, 230:				
Wolfey	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
Bearwallow	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
231, 232:				
Woodin	Poor: depth to rock, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones, slope.
Yellowhound	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
233, 234:				
Xerochrepts.				
Haploxeralfs.				
Argixerolls.				

Table 10.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
235:				
Yellowhound	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Kibesillah	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
236:				
Yellowhound	Fair: depth to rock, thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Kibesillah	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Ornbaun	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
237:				
Yellowhound	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Kibesillah	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Ornbaun	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
238:				
Yellowhound	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Woodin	Poor: depth to rock, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones, slope.
239:				
Yellowhound	Fair: depth to rock, thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Woodin	Poor: depth to rock.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones, slope.
Ornbaun	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.

Table 10.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
240:				
Yellowhound----------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Woodin---------------	Poor: depth to rock, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones, slope.
Ornbaun--------------	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
241:				
Yorkville------------	Poor: shrink-swell, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Hopland--------------	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
242:				
Yorkville------------	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Squawrock------------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Witherell------------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
243:				
Yorkville------------	Poor: shrink-swell, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Squawrock------------	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Witherell------------	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
244:				
Yorkville------------	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.

Table 10.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
244:				
Yorktree	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.
Squawrock	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
245:				
Yorkville	Poor: shrink-swell, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Yorktree	Poor: shrink-swell, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.
Squawrock	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

Table 11.--Water Management

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
101, 102:							
Abalobadiah	Severe: seepage, slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
Bruhel	Severe: slope.	Moderate: thin layer.	Severe: no water.	Deep to water	Slope	Slope	Slope.
Vizcaino	Severe: depth to rock, slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
103, 104:							
Bearwallow	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
Wolfey	Severe: depth to rock, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
105 Biaggi	Moderate: seepage, depth to rock.	Severe: piping.	Severe: no water.	Deep to water	Depth to rock	Depth to rock	Depth to rock.
106 Biaggi	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
107 Bigriver	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Droughty, flooding.	Too sandy, soil blowing.	Droughty.
108:							
Blacklock	Severe: cemented pan.	Severe: seepage, piping, wetness.	Severe: no water.	Cemented pan, too acid.	Wetness, droughty.	Cemented pan, wetness, soil blowing.	Wetness, droughty, cemented pan.
Aborigine	Slight	Severe: hard to pack, wetness.	Severe: slow refill.	Percs slowly	Wetness, soil blowing.	Erodes easily, wetness, soil blowing.	Wetness, erodes easily, percs slowly.
109 Boontling	Moderate: seepage, slope.	Moderate: piping, wetness.	Severe: slow refill.	Slope	Slope, wetness.	Wetness	Favorable.

Table 11.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
110, 111 Boontling	Severe: slope.	Moderate: piping, wetness.	Severe: slow refill.	Slope	Slope, wetness.	Slope, wetness.	Slope.
112, 113:							
Branscomb	Severe: slope.	Moderate: thin layer.	Severe: no water.	Deep to water	Slope, droughty.	Slope	Slope, droughty.
Usal	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
114 Bruhel	Moderate: seepage, depth to rock, slope.	Moderate: thin layer.	Severe: no water.	Deep to water	Slope	Favorable	Favorable.
115:							
Bruhel	Severe: slope.	Moderate: thin layer.	Severe: no water.	Deep to water	Slope	Slope	Slope.
Abalobadiah	Severe: seepage, slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
Vizcaino	Severe: depth to rock, slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
116:							
Bruhel	Severe: slope.	Moderate: thin layer.	Severe: no water.	Deep to water	Slope	Slope	Slope.
Shinglemill	Severe: slope.	Severe: hard to pack, wetness.	Severe: slow refill.	Percs slowly, slope, too acid.	Slope, wetness, percs slowly.	Slope, wetness, percs slowly.	Wetness, slope, percs slowly.
117:							
Cabrillo	Severe: seepage.	Severe: piping.	Severe: slow refill, cutbanks cave.	Favorable	Wetness, soil blowing.	Wetness, soil blowing.	Favorable.
Heeser	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, soil blowing.	Too sandy, soil blowing.	Droughty.
118 Carlain	Severe: seepage.	Slight	Severe: no water.	Deep to water	Slope	Erodes easily	Erodes easily.

Table 11.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
119, 120:							
Casabonne	Severe: slope.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Slope	Slope	Slope.
Wohly	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
121:							
Casabonne	Severe: slope.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Slope	Slope	Slope.
Wohly	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
Pardaloe	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty.	Slope, large stones.	Large stones, slope, droughty.
122 Caspar	Severe: seepage.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Soil blowing	Favorable.
123:							
Caspar	Severe: seepage, slope.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, soil blowing.	Slope.
Quinliven	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, soil blowing, percs slowly.	Slope, erodes easily, soil blowing.	Slope, erodes easily, percs slowly.
124:							
Caspar	Severe: seepage, slope.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, soil blowing.	Slope.
Quinliven	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, soil blowing, percs slowly.	Slope, erodes easily, soil blowing.	Slope, erodes easily, percs slowly.
Ferncreek	Severe: slope.	Severe: hard to pack.	Severe: slow refill.	Percs slowly, slope, too acid.	Slope, wetness, soil blowing.	Slope, wetness, soil blowing.	Slope, percs slowly.

Table 11.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
125 Cleone	Severe: seepage.	Severe: piping.	Severe: cutbanks cave.	Slope, cutbanks cave.	Slope, wetness, droughty.	Wetness, too sandy.	Droughty.
126. Coastal beaches							
127 Cole	Slight	Moderate: wetness.	Severe: slow refill.	Percs slowly	Wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Erodes easily, percs slowly.
128 Cole	Slight	Slight	Severe: no water.	Deep to water	Percs slowly, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
129, 130:							
Comptche	Severe: slope.	Slight	Severe: no water.	Deep to water	Slope	Slope	Slope.
Zeni	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
131 Cottoneva	Moderate: seepage.	Severe: piping.	Severe: slow refill.	Flooding	Wetness, soil blowing, flooding.	Wetness, soil blowing.	Favorable.
132 Crispin	Moderate: seepage, depth to rock.	Severe: piping.	Severe: no water.	Deep to water	Depth to rock	Depth to rock	Depth to rock.
133:							
Dann	Severe: slope.	Severe: large stones.	Severe: no water.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Hiltabidel	Severe: depth to rock, slope.	Severe: piping, large stones.	Severe: no water.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
134:							
Dann	Severe: slope.	Severe: large stones.	Severe: no water.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Littlered	Severe: slope.	Moderate: piping, large stones.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, large stones, soil blowing.	Large stones, slope.

Table 11.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
134:							
Hiltabidel	Severe: depth to rock, slope.	Severe: piping, large stones.	Severe: no water.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
135, 136:							
Dehaven	Severe: slope.	Moderate: thin layer.	Severe: no water.	Deep to water	Slope, droughty.	Slope	Slope, droughty.
Hotel	Severe: slope.	Moderate: thin layer.	Severe: no water.	Deep to water	Slope, droughty, depth to rock.	Slope, depth to rock.	Slope, droughty, depth to rock.
137:							
Dehaven	Severe: slope.	Moderate: thin layer.	Severe: no water.	Deep to water	Slope, droughty.	Slope	Slope, droughty.
Hotel	Severe: slope.	Moderate: thin layer.	Severe: no water.	Deep to water	Slope, droughty, depth to rock.	Slope, depth to rock.	Slope, droughty, depth to rock.
Irmulco	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope	Slope.
138. Duneland							
139. Dystropepts							
140 Feliz	Moderate: seepage.	Moderate: piping.	Severe: no water.	Deep to water	Favorable	Favorable	Favorable.
141 Ferncreek	Moderate: seepage, slope.	Severe: hard to pack.	Severe: slow refill.	Percs slowly, slope, too acid.	Slope, wetness, soil blowing.	Wetness, soil blowing.	Percs slowly.
142, 143:							
Fishrock	Severe: depth to rock, slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, percs slowly, depth to rock.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Iversen	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, percs slowly.	Slope, depth to rock.	Slope, depth to rock, percs slowly.
144 Flumeville	Slight	Severe: wetness.	Severe: slow refill.	Percs slowly	Wetness, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.

Table 11.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
145--------------- Flumeville	Severe: slope.	Severe: wetness.	Severe: slow refill.	Percs slowly, slope.	Slope, wetness, percs slowly.	Slope, wetness, percs slowly.	Wetness, slope, percs slowly.
146:							
Garcia-----------	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
Snook------------	Severe: depth to rock, slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
Gube-------------	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, percs slowly, depth to rock.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
147:							
Gibney-----------	Severe: slope.	Severe: hard to pack.	Severe: slow refill.	Percs slowly, slope, too acid.	Slope, wetness, percs slowly.	Slope, wetness, percs slowly.	Slope, percs slowly.
Gibwell----------	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, fast intake, soil blowing.	Slope, too sandy, soil blowing.	Slope, percs slowly.
148--------------- Gibwell	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, fast intake, soil blowing.	Too sandy, soil blowing.	Percs slowly.
149--------------- Gibwell	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, fast intake, soil blowing.	Slope, too sandy, soil blowing.	Slope, percs slowly.
150, 151, 152----- Glenblair	Severe: slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope----------	Slope----------	Slope.
153:							
Gschwend---------	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Slope----------	Too sandy------	Favorable.
Frenchman--------	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty.	Large stones, too sandy.	Large stones, droughty.

Table 11.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
154:							
Gube-------------	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, percs slowly, depth to rock.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Garcia-----------	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
Snook------------	Severe: depth to rock, slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
155:							
Haploxeralfs.							
Argixerolls.							
156:							
Haploxeralfs, wet.							
Argixerolls.							
157--------------- Harecreek	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Soil blowing---	Favorable.
158, 159---------- Havensneck	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, soil blowing, depth to rock.	Slope, depth to rock, soil blowing.	Slope, depth to rock.
160:							
Havensneck-------	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, soil blowing, depth to rock.	Slope, depth to rock, soil blowing.	Slope, depth to rock.
Seaside----------	Severe: depth to rock, slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Slope, depth to rock, soil blowing.	Slope, droughty, depth to rock.
161--------------- Heeser	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, soil blowing.	Slope, too sandy, soil blowing.	Slope, droughty.

Table 11.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
162:							
Hiltabidel	Severe: depth to rock, slope.	Severe: piping, large stones.	Severe: no water.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Dann	Severe: slope.	Severe: large stones.	Severe: no water.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
163:							
Holohan	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, large stones, droughty.	Slope, large stones, too sandy.	Large stones, slope, droughty.
Hollowtree	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
164, 165:							
Holohan	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, large stones, droughty.	Slope, large stones, too sandy.	Large stones, slope, droughty.
Hollowtree	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Casabonne	Severe: slope.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Slope	Slope	Slope.
166, 167 Hopland	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
168:							
Hopland	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
Squawrock	Severe: slope.	Moderate: piping, large stones.	Severe: no water.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
169:							
Hopland	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.

Table 11.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
169:							
Witherell	Severe: depth to rock, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
Squawrock	Severe: slope.	Moderate: piping, large stones.	Severe: no water.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
170, 171:							
Hopland	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
Wohly	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
172, 173, 174:							
Irmulco	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope	Slope.
Tramway	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
175, 176 Iversen	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, percs slowly.	Slope, depth to rock.	Slope, depth to rock, percs slowly.
177 Iversen	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, soil blowing, percs slowly.	Slope, depth to rock, soil blowing.	Slope, depth to rock, percs slowly.
178:							
Kibesillah	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Yellowhound	Severe: slope.	Moderate: thin layer.	Severe: no water.	Deep to water	Slope, droughty.	Slope	Slope, droughty.
179 Littlered	Moderate: seepage, slope.	Moderate: piping, large stones.	Severe: no water.	Deep to water	Slope, soil blowing.	Large stones, soil blowing.	Large stones.
180 Mackerricher	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, soil blowing.	Too sandy, soil blowing.	Droughty.

Table 11.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
181 Mackerricher	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, soil blowing.	Slope, too sandy, soil blowing.	Slope, droughty.
182 Mallopass	Slight	Slight	Severe: slow refill.	Deep to water	Favorable	Favorable	Favorable.
183, 184 Mallopass	Severe: slope.	Slight	Severe: slow refill.	Deep to water	Slope	Slope	Slope.
185:							
Maymen	Severe: depth to rock, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock, soil blowing.	Slope, depth to rock.
Etsel	Severe: depth to rock, slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, droughty, depth to rock.	Slope, depth to rock.	Slope, droughty, depth to rock.
Snook	Severe: depth to rock, slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
186:							
Maymen	Severe: depth to rock, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock, soil blowing.	Slope, depth to rock.
Woodin	Severe: slope.	Severe: large stones.	Severe: no water.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Etsel	Severe: depth to rock, slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, droughty, depth to rock.	Slope, depth to rock.	Slope, droughty, depth to rock.
187, 188, 189:							
Ornbaun	Severe: slope.	Moderate: thin layer.	Severe: no water.	Deep to water	Slope	Slope	Slope.
Zeni	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.

Table 11.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
190:							
Pardaloe---------	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty.	Slope, large stones.	Large stones, slope, droughty.
Woodin-----------	Severe: slope.	Severe: large stones.	Severe: no water.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
191:							
Pardaloe---------	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty.	Slope, large stones.	Large stones, slope, droughty.
Woodin-----------	Severe: slope.	Severe: large stones.	Severe: no water.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Casabonne--------	Severe: slope.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Slope----------	Slope----------	Slope.
192--------------- Perrygulch	Moderate: slope.	Severe: wetness.	Severe: no water.	Percs slowly, slope.	Slope, wetness, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
193--------------- Pinole	Moderate: slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope----------	Favorable------	Favorable.
194--------------- Pinole	Severe: slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope----------	Slope----------	Slope.
195:							
Pits.							
Dumps.							
196:							
Quinliven--------	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, soil blowing, percs slowly.	Slope, erodes easily, soil blowing.	Slope, erodes easily, percs slowly.
Ferncreek--------	Severe: slope.	Severe: hard to pack.	Severe: slow refill.	Percs slowly, slope, too acid.	Slope, wetness, soil blowing.	Slope, wetness, soil blowing.	Slope, percs slowly.

Table 11.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
197. Riverwash							
198: Seaside	Severe: depth to rock, slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Slope, depth to rock, soil blowing.	Slope, droughty, depth to rock.
Rock outcrop.							
199: Shinglemill	Moderate: slope.	Severe: hard to pack, wetness.	Severe: slow refill.	Percs slowly, slope, too acid.	Slope, wetness, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
Gibney	Moderate: slope.	Severe: hard to pack.	Severe: slow refill.	Percs slowly, slope, too acid.	Slope, wetness, percs slowly.	Wetness, percs slowly.	Percs slowly.
200: Shortyork	Severe: seepage, slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, droughty, depth to rock.	Slope, depth to rock.	Slope, droughty, depth to rock.
Tyson	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, droughty, depth to rock.	Slope, depth to rock.	Slope, droughty, depth to rock.
Witherell	Severe: depth to rock, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
201, 202, 203: Shortyork	Severe: seepage, slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, droughty, depth to rock.	Slope, depth to rock.	Slope, droughty, depth to rock.
Yorkville	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, percs slowly.	Slope, percs slowly.	Slope, percs slowly.
Witherell	Severe: depth to rock, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
204 Sirdrak	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Slope, too sandy, soil blowing.	Slope, droughty.

Table 11.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
205, 206:							
Squawrock	Severe: slope.	Moderate: piping, large stones.	Severe: no water.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Garcia	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
Witherell	Severe: depth to rock, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
207, 208:							
Squawrock	Severe: slope.	Moderate: piping, large stones.	Severe: no water.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Witherell	Severe: depth to rock, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
209 Stornetta	Moderate: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Flooding	Wetness, soil blowing, flooding.	Wetness, soil blowing.	Wetness.
210 Talmage	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Droughty	Favorable	Droughty.
211:							
Threechop	Severe: slope.	Moderate: thin layer, hard to pack.	Severe: no water.	Deep to water	Slope	Slope	Slope.
Ornbaun	Severe: slope.	Moderate: thin layer.	Severe: no water.	Deep to water	Slope	Slope	Slope.
212:							
Tregoning	Severe: seepage.	Severe: piping.	Severe: no water.	Cemented pan, cutbanks cave.	Wetness, droughty.	Cemented pan, wetness.	Wetness, droughty.
Cleone	Severe: seepage.	Severe: piping.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty.	Wetness, too sandy.	Droughty.

Table 11.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
213:							
Tregoning--------	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Cemented pan, slope, cutbanks cave.	Slope, wetness, droughty.	Slope, cemented pan, wetness.	Wetness, slope, droughty.
Cleone-----------	Severe: seepage, slope.	Severe: piping.	Severe: cutbanks cave.	Slope, cutbanks cave.	Slope, wetness, droughty.	Slope, wetness, too sandy.	Slope, droughty.
214. Tropaquepts							
215, 216:							
Tyson------------	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, droughty, depth to rock.	Slope, depth to rock.	Slope, droughty, depth to rock.
Updegraff--------	Severe: slope.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Slope----------	Slope----------	Slope.
217--------------- Updegraff	Severe: slope.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Slope----------	Slope----------	Slope.
218:							
Updegraff--------	Severe: slope.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Slope----------	Slope----------	Slope.
Hopland----------	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
Woodin-----------	Severe: slope.	Severe: large stones.	Severe: no water.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
219. Urban land							
220:							
Usal-------------	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
Branscomb--------	Severe: slope.	Moderate: thin layer.	Severe: no water.	Deep to water	Slope, droughty.	Slope----------	Slope, droughty.

Table 11.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
221 Vandamme	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, percs slowly.	Slope, percs slowly.	Slope, percs slowly.
222:							
Vandamme	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, soil blowing, percs slowly.	Slope, soil blowing, percs slowly.	Slope, percs slowly.
Caspar	Severe: seepage, slope.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, soil blowing.	Slope.
223:							
Vandamme	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, percs slowly.	Slope, percs slowly.	Slope, percs slowly.
Irmulco	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope	Slope.
224:							
Vandamme	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, percs slowly.	Slope, percs slowly.	Slope, percs slowly.
Irmulco	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope	Slope.
Tramway	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
225 Windyhollow	Slight	Moderate: piping, wetness.	Severe: slow refill.	Favorable	Wetness	Wetness	Favorable.
226, 227 Windyhollow	Severe: slope.	Moderate: piping, wetness.	Severe: slow refill.	Slope	Slope, wetness.	Slope, wetness.	Slope.
228:							
Witherell	Severe: depth to rock, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
Hopland	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.

Table 11.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
228:							
Squawrock	Severe: slope.	Moderate: piping, large stones.	Severe: no water.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
229, 230:							
Wolfey	Severe: depth to rock, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
Bearwallow	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
231, 232:							
Woodin	Severe: slope.	Severe: large stones.	Severe: no water.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Yellowhound	Severe: slope.	Moderate: thin layer.	Severe: no water.	Deep to water	Slope, droughty.	Slope	Slope, droughty.
233, 234:							
Xerochrepts.							
Haploxeralfs.							
Argixerolls.							
235:							
Yellowhound	Severe: slope.	Moderate: thin layer.	Severe: no water.	Deep to water	Slope, droughty.	Slope	Slope, droughty.
Kibesillah	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
236, 237:							
Yellowhound	Severe: slope.	Moderate: thin layer.	Severe: no water.	Deep to water	Slope, droughty.	Slope	Slope, droughty.
Kibesillah	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Ornbaun	Severe: slope.	Moderate: thin layer.	Severe: no water.	Deep to water	Slope	Slope	Slope.

Table 11.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
238:							
Yellowhound	Severe: slope.	Moderate: thin layer.	Severe: no water.	Deep to water	Slope, droughty.	Slope	Slope, droughty.
Woodin	Severe: slope.	Severe: large stones.	Severe: no water.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
239, 240:							
Yellowhound	Severe: slope.	Moderate: thin layer.	Severe: no water.	Deep to water	Slope, droughty.	Slope	Slope, droughty.
Woodin	Severe: slope.	Severe: large stones.	Severe: no water.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Ornbaun	Severe: slope.	Moderate: thin layer.	Severe: no water.	Deep to water	Slope	Slope	Slope.
241:							
Yorkville	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, percs slowly.	Slope, percs slowly.	Slope, percs slowly.
Hopland	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
242, 243:							
Yorkville	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, percs slowly.	Slope, percs slowly.	Slope, percs slowly.
Squawrock	Severe: slope.	Moderate: piping, large stones.	Severe: no water.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Witherell	Severe: depth to rock, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
244, 245:							
Yorkville	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, percs slowly.	Slope, percs slowly.	Slope, percs slowly.
Yorktree	Severe: slope.	Moderate: thin layer, hard to pack.	Severe: no water.	Deep to water	Slope, percs slowly.	Slope, percs slowly.	Slope, percs slowly.

Table 11.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
244, 245:							
Squawrock	Severe: slope.	Moderate: piping, large stones.	Severe: no water.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.

Table 12.--Engineering Index Properties

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
101, 102:											
Abalobadiah-----	0-13	Loam-------------	CL-ML, ML	A-4	0	85-100	75-100	65-85	50-60	25-35	5-10
	13-21	Loam, sandy clay loam, clay loam.	CL, SC	A-6	0	85-95	75-95	70-80	40-60	25-40	10-20
	21-39	Gravelly sandy loam, gravelly loam.	GM-GC, GM, SC-SM, SM	A-2	0	60-80	50-75	40-65	20-35	25-35	5-10
	39-43	Weathered bedrock	---	---	---	---	---	---	---	---	---
Bruhel----------	0-4	Loam-------------	CL-ML, ML	A-4	0	85-100	75-100	65-85	50-60	25-35	5-10
	4-21	Clay loam, loam, sandy clay loam.	CL	A-6	0	85-95	75-95	70-80	50-65	25-40	10-20
	21-41	Gravelly clay loam, gravelly loam, gravelly sandy clay loam.	GC, SC	A-6, A-2	0	60-80	50-75	45-70	25-50	25-40	10-20
	41-45	Weathered bedrock	---	---	---	---	---	---	---	---	---
Vizcaino--------	0-2	Loam-------------	CL-ML, ML	A-4	0	85-100	75-95	65-80	50-60	25-35	5-10
	2-13	Sandy clay loam, loam, clay loam.	CL, SC	A-6	0	85-95	75-95	70-80	40-60	25-40	10-20
	13-17	Gravelly loam, gravelly clay loam.	GC, SC	A-6	0	60-80	50-75	45-70	35-50	25-40	10-20
	17-21	Weathered bedrock	---	---	---	---	---	---	---	---	---
103, 104:											
Bearwallow------	0-8	Loam-------------	CL-ML, ML	A-4	0	85-100	75-100	70-90	50-70	25-35	5-10
	8-34	Loam, clay loam	CL	A-6	0	85-100	75-100	70-95	55-75	30-40	10-15
	34-38	Weathered bedrock	---	---	---	---	---	---	---	---	---
Wolfey----------	0-3	Loam-------------	CL-ML, ML	A-4	0	90-100	85-100	60-85	50-70	25-35	5-10
	3-15	Loam-------------	CL-ML, ML	A-4	0	90-100	85-100	60-85	50-70	25-35	5-10
	15-19	Weathered bedrock	---	---	---	---	---	---	---	---	---
105, 106--------- Biaggi	0-23	Loam-------------	ML	A-4	0	80-100	75-100	70-85	50-60	25-35	NP-10
	23-27	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
107-------------- Bigriver	0-6	Loamy sand-------	SM	A-2	0	100	100	50-75	15-30	---	NP
	6-63	Stratified loamy sand to silt loam.	SM	A-2, A-4	0	100	100	60-75	25-50	15-25	NP-5
108:											
Blacklock-------	0-7	Loamy sand-------	SM	A-2	0	100	100	50-75	15-30	0-14	NP
	7-14	Sandy loam, loamy sand.	SM	A-2, A-4	0	100	100	50-75	15-40	20-25	NP-5
	14-61	Cemented---------	SM, SP-SM	A-2	0	100	100	60-85	5-30	0-14	NP
	61-64	Loamy sand, sand, loamy fine sand.	SM, SP-SM	A-2	0	100	100	60-85	5-30	0-14	NP
Aborigine-------	0-6	Sandy loam-------	SM	A-4	0	95-100	95-100	70-85	35-50	---	NP
	6-13	Loam-------------	ML, CL-ML	A-4	0	95-100	95-100	80-95	50-65	25-35	5-10
	13-61	Sandy clay, clay, clay loam.	ML, MH	A-7	0	100	100	85-100	50-75	40-55	10-20

Table 12.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
109, 110, 111---- Boontling	0-12	Loam-------------	CL-ML, CL	A-4	0	100	100	85-95	60-75	25-35	5-10
	12-30	Loam, silt loam	CL-ML, CL	A-4	0	80-100	75-100	65-95	50-75	25-35	5-10
	30-40	Clay loam, silty clay loam, clay.	CL	A-6, A-7	0	80-100	75-100	70-95	55-85	30-45	10-20
	40-60	Gravelly clay loam, gravelly sandy clay loam.	CL, SC	A-2, A-6	0-15	55-80	50-75	45-70	30-55	30-40	10-20
112, 113: Branscomb-------	0-10	Very gravelly loam.	GM, GM-GC	A-2	0	45-55	40-50	35-45	25-35	25-35	5-10
	10-50	Very gravelly clay loam, very gravelly loam.	GC	A-2	0-10	35-55	30-50	25-45	15-35	25-40	10-20
	50-54	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Usal------------	0-14	Gravelly loam----	SC-SM, SM, GM-GC, GM	A-4	0	65-80	60-75	55-65	35-50	25-35	5-10
	14-29	Gravelly clay loam, gravelly loam.	SC, GC, CL	A-6	0	55-80	50-75	40-65	35-55	30-40	10-20
	29-33	Very gravelly clay loam, very gravelly loam.	GC	A-2	0	40-55	35-50	30-40	25-35	30-40	10-20
	33-37	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
114-------------- Bruhel	0-4	Loam-------------	CL-ML, ML	A-4	0	85-100	75-100	65-85	50-60	25-35	5-10
	4-21	Clay loam, loam, sandy clay loam.	CL	A-6	0	85-95	75-95	70-80	50-65	25-40	10-20
	21-41	Gravelly clay loam, gravelly loam, gravelly sandy clay loam.	GC, SC	A-6, A-2	0	60-80	50-75	45-70	25-50	25-40	10-20
	41-45	Weathered bedrock	---	---	---	---	---	---	---	---	---
115: Bruhel----------	0-4	Loam-------------	CL-ML, ML	A-4	0	85-100	75-100	65-85	50-60	25-35	5-10
	4-21	Clay loam, loam, sandy clay loam.	CL	A-6	0	85-95	75-95	70-80	50-65	25-40	10-20
	21-41	Gravelly clay loam, gravelly loam, gravelly sandy clay loam.	GC, SC	A-6, A-2	0	60-80	50-75	45-70	25-50	25-40	10-20
	41-45	Weathered bedrock	---	---	---	---	---	---	---	---	---
Abalobadiah-----	0-13	Loam-------------	CL-ML, ML	A-4	0	85-100	75-100	65-85	50-60	25-35	5-10
	13-21	Loam, sandy clay loam, clay loam.	CL, SC	A-6	0	85-95	75-95	70-80	40-60	25-40	10-20
	21-39	Gravelly sandy loam, gravelly loam.	GM-GC, GM, SC-SM, SM	A-2	0	60-80	50-75	40-65	20-35	25-35	5-10
	39-43	Weathered bedrock	---	---	---	---	---	---	---	---	---

Table 12.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
115:											
Vizcaino--------	0-2	Loam------------	CL-ML, ML	A-4	0	85-100	75-95	65-80	50-60	25-35	5-10
	2-13	Sandy clay loam, loam, clay loam.	CL, SC	A-6	0	85-95	75-95	70-80	40-60	25-40	10-20
	13-17	Gravelly loam, gravelly clay loam.	GC, SC	A-6	0	60-80	50-75	45-70	35-50	25-40	10-20
	17-21	Weathered bedrock	---	---	---	---	---	---	---	---	---
116:											
Bruhel----------	0-4	Loam------------	CL-ML, ML	A-4	0	85-100	75-100	65-85	50-60	25-35	5-10
	4-21	Clay loam, loam, sandy clay loam.	CL	A-6	0	85-95	75-95	70-80	50-65	25-40	10-20
	21-41	Gravelly clay loam, gravelly loam, gravelly sandy clay loam.	GC, SC	A-6, A-2	0	60-80	50-75	45-70	25-50	25-40	10-20
	41-45	Weathered bedrock	---	---	---	---	---	---	---	---	---
Shinglemill-----	0-8	Loam------------	ML	A-4	0	80-95	75-95	70-85	50-65	25-35	NP-10
	8-15	Loam, sandy clay loam.	CL	A-6	0	80-100	75-100	70-85	40-65	30-40	10-15
	15-25	Clay loam, clay	ML, MH	A-7	0	80-100	75-100	75-90	60-80	40-65	10-25
	25-63	Sandy clay, clay	ML, MH	A-7	0	80-100	75-100	65-80	50-80	45-65	15-25
117:											
Cabrillo--------	0-26	Sandy loam-------	SM	A-4	0	100	100	65-80	35-50	20-30	NP-5
	26-35	Sandy clay loam	SC	A-6	0	100	100	80-90	35-50	30-40	10-20
	35-50	Sandy clay loam, sandy clay.	SC	A-6, A-7	0	100	100	80-90	35-50	30-45	10-20
	50-60	Sandy loam, loamy sand.	SM	A-2	0	100	100	50-70	10-35	20-30	NP-5
Heeser----------	0-34	Sandy loam-------	SM	A-2, A-4	0	100	95-100	60-80	30-40	20-30	NP-5
	34-65	Sandy loam, loamy sand, sand.	SM	A-2	0	100	95-100	50-80	15-35	---	NP
118-------------- Carlain	0-5	Loam------------	ML	A-4	0	90-100	85-100	70-95	50-75	25-35	NP-10
	5-29	Loam, clay loam, sandy clay loam.	CL, CL-ML, SC-SM, SC	A-4, A-6	0	80-100	75-95	65-90	40-75	25-40	5-15
	29-61	Stratified extremely gravelly loam to very gravelly clay loam.	GC, GM-GC	A-2	0-15	30-55	25-50	20-45	10-35	25-35	5-15
119:											
Casabonne-------	0-11	Loam------------	ML	A-4	0	80-100	75-95	65-85	50-65	25-35	NP-10
	11-49	Clay loam, sandy clay loam.	CL	A-6	0	80-100	75-95	70-90	50-75	30-40	10-20
	49-53	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Wohly-----------	0-10	Loam------------	CL-ML, ML	A-4	0	80-100	75-100	65-90	50-65	25-35	5-10
	10-26	Clay loam, sandy clay loam, loam.	SC, CL	A-6	0	80-100	75-95	70-90	35-70	30-40	10-20
	26-31	Gravelly clay loam.	GC, CL	A-6	0-5	55-80	50-75	45-70	40-60	30-40	10-20
	31-41	Weathered bedrock	---	---	---	---	---	---	---	---	---

Table 12.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
120:											
Casabonne-------	0-11	Gravelly loam----	GM, SM	A-4	0	65-80	60-75	50-65	40-50	25-35	NP-10
	11-49	Clay loam, sandy clay loam.	CL	A-6	0	80-100	75-95	70-90	50-75	30-40	10-20
	49-53	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Wohly-----------	0-10	Loam------------	CL-ML, ML	A-4	0	80-100	75-100	65-90	50-65	25-35	5-10
	10-26	Clay loam, sandy clay loam, loam.	SC, CL	A-6	0	80-100	75-95	70-90	35-70	30-40	10-20
	26-31	Gravelly clay loam.	GC, CL	A-6	0-5	55-80	50-75	45-70	40-60	30-40	10-20
	31-41	Weathered bedrock	---	---	---	---	---	---	---	---	---
121:											
Casabonne-------	0-11	Gravelly loam----	GM, SM	A-4	0	65-80	60-75	50-65	40-50	25-35	NP-10
	11-49	Clay loam, sandy clay loam.	CL	A-6	0	80-100	75-95	70-90	50-75	30-40	10-20
	49-53	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Wohly-----------	0-10	Loam------------	CL-ML, ML	A-4	0	80-100	75-100	65-90	50-65	25-35	5-10
	10-26	Clay loam, sandy clay loam, loam.	SC, CL	A-6	0	80-100	75-95	70-90	35-70	30-40	10-20
	26-31	Gravelly clay loam.	GC, CL	A-6	0-5	55-80	50-75	45-70	40-60	30-40	10-20
	31-41	Weathered bedrock	---	---	---	---	---	---	---	---	---
Pardaloe--------	0-11	Very gravelly loam.	GM, GM-GC	A-1, A-2	0-10	40-55	35-50	20-45	15-35	20-30	NP-10
	11-26	Very gravelly sandy loam, extremely gravelly sandy loam.	GM, GP-GM	A-1	0-10	20-55	15-50	10-30	5-20	20-30	NP-5
	26-54	Very gravelly loam, very gravelly sandy clay loam, extremely gravelly sandy clay loam.	GM, GM-GC, GP-GM	A-2	0-30	20-55	15-50	10-45	5-35	25-35	5-10
	54-58	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
122------------- Caspar	0-16	Sandy loam-------	SM	A-4	0	100	95-100	60-75	35-50	20-30	NP-5
	16-37	Sandy loam, loam, sandy clay loam.	SC-SM, SC	A-4, A-6	0	85-100	75-100	50-85	35-50	25-35	5-15
	37-48	Sandy clay loam, clay loam, sandy clay.	SC, CL	A-6, A-7	0	85-100	75-100	65-90	35-60	30-45	10-20
	48-62	Sandy loam, loamy sand.	SM	A-2	0	100	100	50-70	20-35	20-30	NP-5

Table 12.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
123:											
Caspar	0-16	Sandy loam	SM	A-4	0	100	95-100	60-75	35-50	20-30	NP-5
	16-37	Sandy loam, loam, sandy clay loam.	SC-SM, SC	A-4, A-6	0	85-100	75-100	50-85	35-50	25-35	5-15
	37-48	Sandy clay loam, clay loam, sandy clay.	SC, CL	A-6, A-7	0	85-100	75-100	65-90	35-60	30-45	10-20
	48-62	Sandy loam, loamy sand.	SM	A-2	0	100	100	50-70	20-35	20-30	NP-5
Quinliven	0-4	Sandy loam	SM	A-2, A-4	0	100	100	60-70	30-45	20-30	NP-5
	4-11	Sandy loam, loam	SM, SC-SM, ML, CL-ML	A-4	0	100	100	65-90	35-60	25-35	5-10
	11-18	Loam, sandy clay loam, clay loam.	CL, SC	A-6	0	100	100	80-95	45-75	25-40	10-20
	18-51	Clay, sandy clay	ML, MH	A-7	0	100	100	85-100	50-95	40-60	10-25
	51-60	Sandy clay loam, clay loam.	SC, CL	A-6	0	100	100	80-100	40-80	30-40	10-20
	60-64	Loamy sand, sandy loam.	SM	A-2, A-4	0	100	100	50-75	20-40	20-30	NP-5
124:											
Caspar	0-16	Sandy loam	SM	A-4	0	100	95-100	60-75	35-50	20-30	NP-5
	16-37	Sandy loam, loam, sandy clay loam.	SC-SM, SC	A-4, A-6	0	85-100	75-100	50-85	35-50	25-35	5-15
	37-48	Sandy clay loam, clay loam, sandy clay.	SC, CL	A-6, A-7	0	85-100	75-100	65-90	35-60	30-45	10-20
	48-62	Sandy loam, loamy sand.	SM	A-2	0	100	100	50-70	20-35	20-30	NP-5
Quinliven	0-4	Sandy loam	SM	A-2, A-4	0	100	100	60-70	30-45	20-30	NP-5
	4-11	Sandy loam, loam	SM, SC-SM, ML, CL-ML	A-4	0	100	100	65-90	35-60	25-35	5-10
	11-18	Loam, sandy clay loam, clay loam.	CL, SC	A-6	0	100	100	80-95	45-75	25-40	10-20
	18-51	Clay, sandy clay	ML, MH	A-7	0	100	100	85-100	50-95	40-60	10-25
	51-60	Sandy clay loam, clay loam.	SC, CL	A-6	0	100	100	80-100	40-80	30-40	10-20
	60-64	Loamy sand, sandy loam.	SM	A-2, A-4	0	100	100	50-75	20-40	20-30	NP-5
Ferncreek	0-7	Sandy loam	SM	A-4	0	80-100	75-100	65-75	35-50	20-30	NP-5
	7-33	Clay loam, clay	ML, MH	A-7	0	80-100	75-100	70-90	50-75	40-60	10-25
	33-43	Sandy clay loam	SC, SC-SM	A-4, A-6	0	80-100	75-100	65-80	35-50	25-40	5-15
	43-61	Sandy loam, sandy clay loam.	SC, SC-SM	A-4	0	100	100	60-75	35-50	20-30	5-10
125	0-3	Loamy sand	SM	A-2	0	100	100	50-75	15-30	---	NP
Cleone	3-7	Sandy loam	SM	A-2	0	85-100	80-100	50-70	25-35	20-30	NP-5
	7-13	Gravelly sandy loam, gravelly loamy sand.	SM, SC-SM	A-2	0	70-85	60-75	40-60	25-35	20-30	NP-10
	13-40	Sandy loam, loamy sand.	SM, SC-SM	A-2, A-4	0	95-100	90-100	50-75	30-50	20-30	NP-10
	40-62	Loamy sand, sand	SM	A-2	0	100	100	50-70	15-30	---	NP
126.											
Coastal beaches											

Table 12.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
127 Cole	0-18	Loam	ML	A-4	0	100	95-100	75-100	60-85	25-35	NP-10
	18-60	Clay, clay loam	CL	A-6, A-7	0	100	100	90-100	70-95	35-50	15-25
128 Cole	0-18	Loam	ML	A-4	0	100	95-100	80-95	60-75	25-35	NP-10
	18-60	Clay loam, clay	CL	A-6, A-7	0	100	100	90-100	70-95	35-50	15-25
129, 130:											
Comptche	0-6	Gravelly loam	GM-GC, GM, SM, SC-SM	A-4	0	65-80	60-75	50-65	35-50	25-35	5-10
	6-31	Gravelly clay loam.	GC, CL	A-6, A-7	0-15	60-75	55-70	50-70	40-60	30-45	10-20
	31-69	Very gravelly clay loam, very gravelly clay, gravelly clay.	GC, CL	A-2, A-7	0-15	45-75	40-70	35-65	25-60	40-50	15-25
	69-73	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Zeni	0-4	Loam	CL-ML, ML	A-4	0	95-100	90-100	80-90	55-70	25-35	5-10
	4-30	Clay loam, sandy clay loam, loam.	CL, SC, CL-ML, SC-SM	A-6, A-4	0	80-100	75-95	60-90	45-75	25-40	5-20
	30-34	Weathered bedrock	---	---	---	---	---	---	---	---	---
131 Cottoneva	0-12	Loam	ML, CL-ML	A-4	0	100	95-100	85-95	50-75	20-30	NP-10
	12-43	Stratified sandy loam to silt loam.	SM	A-4	0	100	95-100	60-85	35-50	15-25	NP-5
	43-63	Stratified loam to clay loam.	CL-ML, CL	A-4, A-6	0	100	95-100	80-95	55-75	25-40	5-15
132 Crispin	0-14	Loam	ML	A-4	0	95-100	90-100	75-85	50-65	25-35	NP-10
	14-23	Loam	CL, CL-ML	A-6, A-4	0	95-100	90-100	80-90	60-75	25-35	5-15
	23-62	Weathered bedrock	---	---	---	---	---	---	---	---	---
133:											
Dann	0-5	Very cobbly clay loam.	ML	A-6, A-7	45-65	95-100	90-95	80-90	70-80	35-50	10-20
	5-31	Very stony clay loam, extremely stony clay loam, very stony clay.	ML	A-6, A-7	55-75	95-100	90-95	80-90	70-80	35-50	10-20
	31-35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Hiltabidel	0-13	Very stony clay loam.	ML, CL	A-4, A-6	40-60	90-95	85-95	75-90	60-80	30-40	5-15
	13-17	Extremely stony clay loam.	ML, CL	A-4, A-6	60-80	90-95	85-95	75-90	60-80	30-40	5-15
	17-21	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
134:											
Dann	0-5	Very cobbly clay loam.	ML	A-6, A-7	45-65	95-100	90-95	80-90	70-80	35-50	10-20
	5-31	Very stony clay loam, extremely stony clay loam, very stony clay.	ML	A-6, A-7	55-75	95-100	90-95	80-90	70-80	35-50	10-20
	31-35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

Table 12.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
134:											
Littlered	0-10	Clay loam	MH	A-7	5-25	100	95-100	90-100	70-80	55-65	15-25
	10-26	Clay loam, clay	MH	A-7	5-25	100	95-100	90-100	70-90	50-65	10-25
	26-65	Loam, clay loam	ML	A-6, A-7	5-25	100	95-100	85-95	60-80	35-50	10-20
Hiltabidel	0-13	Very stony clay loam.	ML, CL	A-4, A-6	40-60	90-95	85-95	75-90	60-80	30-40	5-15
	13-17	Extremely stony clay loam.	ML, CL	A-4, A-6	60-80	90-95	85-95	75-90	60-80	30-40	5-15
	17-21	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
135, 136:											
Dehaven	0-17	Gravelly loam	GM-GC, GM, SC-SM, SM	A-4	0	60-80	50-75	45-70	35-50	25-35	5-10
	17-34	Very gravelly sandy clay loam, very gravelly clay loam.	GC	A-2	0-25	30-60	25-50	25-45	15-35	25-40	10-20
	34-52	Extremely gravelly sandy clay loam, extremely gravelly clay loam.	GC, GP-GC	A-2	0-25	25-30	15-25	10-25	5-20	25-40	10-20
	52-56	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Hotel	0-8	Very gravelly loam.	GM-GC, GM	A-2	0-5	40-55	35-50	30-45	25-35	25-35	5-10
	8-35	Very gravelly clay loam, very gravelly sandy clay loam, extremely gravelly clay loam.	GC, GP-GC	A-2	0-15	20-60	15-55	10-45	5-35	30-40	10-20
	35-39	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
137:											
Dehaven	0-17	Gravelly loam	GM-GC, GM, SC-SM, SM	A-4	0	60-80	50-75	45-70	35-50	25-35	5-10
	17-34	Very gravelly sandy clay loam, very gravelly clay loam.	GC	A-2	0-25	30-60	25-50	25-45	15-35	25-40	10-20
	34-52	Extremely gravelly sandy clay loam, extremely gravelly clay loam.	GC, GP-GC	A-2	0-25	25-30	15-25	10-25	5-20	25-40	10-20
	52-56	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

Table 12.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
137:											
Hotel	0-8	Very gravelly loam.	GM-GC, GM	A-2	0-5	40-55	35-50	30-45	25-35	25-35	5-10
	8-35	Very gravelly clay loam, very gravelly sandy clay loam, extremely gravelly clay loam.	GC, GP-GC	A-2	0-15	20-60	15-55	10-45	5-35	30-40	10-20
	35-39	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Irmulco	0-6	Loam	CL-ML, ML	A-4	0	90-100	85-100	75-95	55-70	25-35	5-10
	6-41	Loam, clay loam, gravelly loam.	GM-GC, GC, CL-ML, CL	A-4, A-6	0	65-100	60-100	50-90	40-75	25-40	5-15
	41-61	Clay loam, gravelly clay loam.	GC, CL	A-6, A-7	0	65-100	60-100	55-90	45-75	30-50	10-25
	61-71	Weathered bedrock	---	---	---	---	---	---	---	---	---
138. Duneland											
139. Dystropepts											
140 Feliz	0-27	Loam	CL-ML, ML	A-4	0	90-100	80-100	70-90	55-70	25-35	5-10
	27-60	Loam, clay loam	CL-ML, CL	A-4, A-6	0	90-100	80-100	75-95	60-75	25-40	5-20
141 Ferncreek	0-7	Sandy loam	SM	A-4	0	80-100	75-100	65-75	35-50	20-30	NP-5
	7-33	Clay loam, clay	ML, MH	A-7	0	80-100	75-100	70-90	50-75	40-60	10-25
	33-43	Sandy clay loam	SC, SC-SM	A-4, A-6	0	80-100	75-100	65-80	35-50	25-40	5-15
	43-61	Sandy loam, sandy clay loam.	SC, SC-SM	A-4	0	100	100	60-75	35-50	20-30	5-10
142, 143:											
Fishrock	0-2	Loam	ML, CL-ML	A-4	0	95-100	90-100	80-90	50-65	25-35	5-10
	2-7	Clay loam	CL	A-6	0	80-100	75-100	70-95	60-75	30-40	10-20
	7-12	Clay	CL	A-7	0	80-100	75-100	70-100	65-95	40-50	15-25
	12-16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Iversen	0-7	Loam	ML, CL-ML	A-4	0	95-100	85-100	75-90	55-70	25-35	5-10
	7-10	Clay loam, clay	ML, MH	A-7	0	85-100	75-100	70-95	60-80	40-50	10-20
	10-37	Clay, gravelly clay.	ML, MH	A-7	0	75-100	70-100	65-95	60-90	45-65	15-30
	37-47	Weathered bedrock	---	---	---	---	---	---	---	---	---
144, 145 Flumeville	0-11	Clay loam	CL	A-6	0	100	100	90-100	70-80	30-40	10-20
	11-62	Clay loam, clay	CL, CH	A-7	0	90-100	85-100	80-100	70-95	40-60	20-35
146:											
Garcia	0-11	Loam	CL-ML, ML	A-4	0	80-100	75-95	65-85	50-75	25-35	5-10
	11-19	Loam, clay loam	CL	A-6	0	80-90	75-85	65-80	50-65	30-40	10-15
	19-28	Gravelly loam, gravelly clay loam.	CL, SC, GC	A-6	0	60-80	55-75	50-70	35-60	30-40	10-15
	28-32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

Table 12.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
146:											
Snook	0-6	Loam	ML	A-4	0	80-100	75-95	65-85	50-70	20-35	NP-10
	6-10	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Gube	0-4	Loam	CL-ML, ML	A-4	0	100	95-100	85-90	60-75	25-35	5-10
	4-16	Clay loam	CL	A-6, A-7	0	90-100	85-95	80-90	70-80	30-45	10-20
	16-30	Clay loam, clay	CL, MH, ML, CH	A-7	0	90-100	85-95	80-95	70-90	40-55	15-25
	30-34	Weathered bedrock	---	---	---	---	---	---	---	---	---
147:											
Gibney	0-9	Loam	ML, CL-ML	A-4	0	80-100	75-100	70-85	50-65	25-35	5-10
	9-29	Sandy clay loam, clay loam.	CL, SC	A-6	0	80-100	75-100	75-85	40-65	30-40	10-20
	29-55	Clay	ML, MH	A-7	0	80-100	75-100	75-90	50-80	40-60	10-25
	55-63	Sandy clay loam, sandy clay.	SC	A-6, A-7	0	80-100	75-100	65-80	35-50	30-50	10-25
Gibwell	0-12	Loamy sand	SM	A-2	0	100	100	50-75	15-30	---	NP
	12-18	Clay loam, sandy clay loam.	SC, CL	A-6	0	95-100	90-100	80-95	40-70	30-40	10-15
	18-26	Sandy clay, clay	ML, MH	A-7	0	95-100	90-100	85-95	50-80	40-60	10-25
	26-42	Sandy clay loam	SC	A-6	0	95-100	90-100	75-90	35-50	30-40	10-15
	42-65	Sandy loam, loamy sand, sand.	SM	A-2	0	100	100	50-75	10-30	---	NP
148, 149 Gibwell	0-12	Loamy sand	SM	A-2	0	100	100	50-75	15-30	---	NP
	12-18	Clay loam, sandy clay loam.	SC, CL	A-6	0	95-100	90-100	80-95	40-70	30-40	10-15
	18-26	Sandy clay, clay	ML, MH	A-7	0	95-100	90-100	85-95	50-80	40-60	10-25
	26-42	Sandy clay loam	SC	A-6	0	95-100	90-100	75-90	35-50	30-40	10-15
	42-65	Sandy loam, loamy sand, sand.	SM	A-2	0	100	100	50-75	10-30	---	NP
150, 151, 152 Glenblair	0-10	Gravelly loam	GM-GC, SC-SM, GM, SM	A-4	0	65-80	60-75	50-65	35-50	25-35	5-10
	10-39	Gravelly clay loam.	GC, SC, CL	A-6	0-15	60-75	55-70	50-70	40-60	30-40	10-20
	39-62	Gravelly clay, very gravelly clay, very gravelly clay loam.	SC, GC, CL	A-7, A-2	0-15	45-75	40-70	35-70	30-60	40-50	15-25
	62-66	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
153:											
Gschwend	0-12	Loam	ML	A-4	0	85-100	85-100	75-95	55-70	25-35	NP-10
	12-19	Stratified sandy loam to loam.	ML, CL-ML, SM, SC-SM	A-4	0	85-100	80-100	50-85	35-65	25-35	5-10
	19-35	Stratified sandy loam to sandy clay loam.	ML, CL-ML, SM, SC-SM	A-4	0	85-100	80-100	55-85	35-65	25-35	5-10
	35-61	Stratified extremely gravelly loamy sand to gravelly sandy clay loam.	GM-GC, GM	A-2	0-15	25-60	20-50	15-40	10-30	25-35	5-10

Table 12.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
153:											
Frenchman-------	0-10	Very gravelly sandy loam.	GM	A-1	0-15	40-55	35-50	25-40	15-25	20-30	NP-5
	10-30	Stratified very gravelly sandy loam to very gravelly sandy clay loam.	GM	A-1, A-2	5-15	40-60	35-55	25-45	15-25	20-35	NP-10
	30-62	Stratified very gravelly sand to extremely cobbly sandy loam.	GM, GP-GM, SM, SP-SM	A-1	15-55	40-60	35-55	15-35	5-15	---	NP
154:											
Gube------------	0-4	Loam------------	CL-ML, ML	A-4	0	100	95-100	85-90	60-75	25-35	5-10
	4-16	Clay loam--------	CL	A-6, A-7	0	90-100	85-95	80-90	70-80	30-45	10-20
	16-30	Clay loam, clay	CL, MH, ML, CH	A-7	0	90-100	85-95	80-95	70-90	40-55	15-25
	30-34	Weathered bedrock	---	---	---	---	---	---	---	---	---
Garcia----------	0-11	Loam------------	CL-ML, ML	A-4	0	80-100	75-95	65-85	50-75	25-35	5-10
	11-19	Loam, clay loam	CL	A-6	0	80-90	75-85	65-80	50-65	30-40	10-15
	19-28	Gravelly loam, gravelly clay loam.	CL, SC, GC	A-6	0	60-80	55-75	50-70	35-60	30-40	10-15
	28-32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Snook-----------	0-6	Loam------------	ML	A-4	0	80-100	75-95	65-85	50-70	20-35	NP-10
	6-10	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
155:											
Haploxeralfs.											
Argixerolls.											
156:											
Haploxeralfs, wet.											
Argixerolls.											
157------------- Harecreek	0-8	Sandy loam-------	SM	A-2, A-4	0	95-100	90-100	55-70	30-40	20-30	NP-5
	8-16	Sandy loam-------	SM	A-4	0	95-100	90-100	60-75	35-50	20-30	NP-5
	16-43	Sandy clay loam, sandy loam.	SC-SM, SM	A-4	0	95-100	90-100	65-85	35-50	25-35	5-10
	43-60	Sand, loamy sand, sandy loam.	SP-SM, SM	A-1, A-2, A-3	0	95-100	90-100	40-60	5-30	---	NP
158, 159--------- Havensneck	0-7	Sandy loam-------	SM	A-4	0	95-100	90-100	55-70	35-50	20-30	NP-5
	7-21	Sandy loam-------	SM	A-4	0	95-100	90-100	55-70	35-50	20-30	NP-5
	21-32	Sandy loam, sandy clay loam.	SC-SM, SM	A-4	0	95-100	90-100	65-90	35-50	25-35	5-10
	32-36	Weathered bedrock	---	---	---	---	---	---	---	---	---

Table 12.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
160:											
Havensneck------	0-7	Sandy loam-------	SM	A-4	0	95-100	90-100	55-70	35-50	20-30	NP-5
	7-21	Sandy loam-------	SM	A-4	0	95-100	90-100	55-70	35-50	20-30	NP-5
	21-32	Sandy loam, sandy clay loam.	SC-SM, SM	A-4	0	95-100	90-100	65-90	35-50	25-35	5-10
	32-36	Weathered bedrock	---	---	---	---	---	---	---	---	---
Seaside---------	0-1	Loamy sand-------	SM	A-2, A-1	0-10	90-100	85-100	45-75	15-30	---	NP
	1-7	Sandy loam-------	SM	A-2, A-4	0-10	95-100	90-100	55-70	25-40	20-30	NP-5
	7-11	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
161------------- Heeser	0-34	Sandy loam-------	SM	A-2, A-4	0	100	95-100	60-80	30-40	20-30	NP-5
	34-65	Sandy loam, loamy sand, sand.	SM	A-2	0	100	95-100	50-80	15-35	---	NP
162:											
Hiltabidel------	0-13	Very stony clay loam.	ML, CL	A-4, A-6	40-60	90-95	85-95	75-90	60-80	30-40	5-15
	13-17	Extremely stony clay loam.	ML, CL	A-4, A-6	60-80	90-95	85-95	75-90	60-80	30-40	5-15
	17-21	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Dann------------	0-5	Very cobbly clay loam.	ML	A-6, A-7	45-65	95-100	90-95	80-90	70-80	35-50	10-20
	5-31	Very stony clay loam, extremely stony clay loam, very stony clay.	ML	A-6, A-7	55-75	95-100	90-95	80-90	70-80	35-50	10-20
	31-35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
163:											
Holohan---------	0-4	Extremely gravelly sandy loam.	GP-GM	A-1	0	25-30	20-25	15-20	5-10	20-30	NP-5
	4-17	Very gravelly loam, extremely gravelly loam, very gravelly sandy clay loam.	GC, GM-GC	A-2	0-25	25-60	20-55	15-50	10-35	20-35	5-15
	17-74	Extremely gravelly loamy sand, very gravelly sandy loam.	GP-GM, GM	A-1	0-30	15-55	10-50	10-40	5-25	20-30	NP-5
Hollowtree------	0-6	Gravelly sandy loam.	GM, SM	A-2	0-5	55-80	50-75	40-65	25-35	20-30	NP-5
	6-38	Very gravelly sandy loam, very gravelly loam, very gravelly sandy clay loam.	GC, GM-GC, GP-GC	A-2, A-1	0-10	35-55	30-50	20-35	10-25	25-35	5-15
	38-42	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

Table 12.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
164, 165:											
Holohan---------	0-4	Extremely gravelly sandy loam.	GP-GM	A-1	0	25-30	20-25	15-20	5-10	20-30	NP-5
	4-17	Very gravelly loam, extremely gravelly loam, very gravelly sandy clay loam.	GC, GM-GC	A-2	0-25	25-60	20-55	15-50	10-35	20-35	5-15
	17-74	Extremely gravelly loamy sand, very gravelly sandy loam.	GP-GM, GM	A-1	0-30	15-55	10-50	10-40	5-25	20-30	NP-5
Hollowtree------	0-6	Gravelly sandy loam.	GM, SM	A-2	0-5	55-80	50-75	40-65	25-35	20-30	NP-5
	6-38	Very gravelly sandy loam, very gravelly loam, very gravelly sandy clay loam.	GC, GM-GC, GP-GC	A-2, A-1	0-10	35-55	30-50	20-35	10-25	25-35	5-15
	38-42	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Casabonne-------	0-11	Gravelly loam----	GM, SM	A-4	0	65-80	60-75	50-65	40-50	25-35	NP-10
	11-36	Clay loam, sandy clay loam.	CL	A-6	0	80-100	75-95	70-90	50-75	30-40	10-20
	36-49	Gravelly clay loam, gravelly sandy clay loam.	CL, SC, GC	A-6, A-7	0	65-80	60-75	55-70	40-60	30-45	10-25
	49-53	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
166, 167--------- Hopland	0-15	Loam------------	CL-ML, ML	A-4	0	85-100	80-100	65-90	50-70	25-35	5-10
	15-30	Clay loam, loam	CL	A-6	0	80-95	75-90	65-85	50-65	30-40	10-20
	30-34	Weathered bedrock	---	---	---	---	---	---	---	---	---
168:											
Hopland---------	0-15	Loam------------	CL-ML, ML	A-4	0	85-100	80-100	65-90	50-70	25-35	5-10
	15-30	Clay loam, loam	CL	A-6	0	80-95	75-90	65-85	50-65	30-40	10-20
	30-34	Weathered bedrock	---	---	---	---	---	---	---	---	---
Squawrock-------	0-7	Gravelly loam----	GM, SM	A-2, A-4, A-1	0-5	55-80	50-75	35-60	20-50	20-35	NP-10
	7-16	Very cobbly loam, very cobbly clay loam, extremely cobbly loam.	SC, CL	A-6	35-60	60-90	55-85	50-80	35-60	30-40	10-15
	16-21	Very gravelly sandy clay loam, very gravelly clay loam, very gravelly loam.	GC	A-2	0-5	30-55	25-50	20-45	15-35	30-40	10-15
	21-25	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
169:											
Hopland---------	0-15	Loam------------	CL-ML, ML	A-4	0	85-100	80-100	65-90	50-70	25-35	5-10
	15-30	Clay loam, loam	CL	A-6	0	80-95	75-90	65-85	50-65	30-40	10-20
	30-34	Weathered bedrock	---	---	---	---	---	---	---	---	---

Table 12.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
169:											
Witherell-------	0-1	Loam------------	CL-ML, ML	A-4	0	80-100	75-95	60-85	50-70	25-35	5-10
	1-12	Loam, gravelly loam, sandy loam.	CL-ML, ML, GM-GC, GM	A-4, A-2	0	65-100	60-95	50-85	30-70	25-35	5-10
	12-16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Squawrock-------	0-7	Gravelly loam----	GM, SM	A-2, A-4, A-1	0-5	55-80	50-75	35-60	20-50	20-35	NP-10
	7-32	Very gravelly sandy clay loam, very gravelly clay loam, very gravelly loam.	GC	A-2	0-5	30-55	25-50	20-45	15-35	30-40	10-15
	32-36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
170, 171:											
Hopland---------	0-15	Loam------------	CL-ML, ML	A-4	0	85-100	80-100	65-90	50-70	25-35	5-10
	15-30	Clay loam, loam	CL	A-6	0	80-95	75-90	65-85	50-65	30-40	10-20
	30-34	Weathered bedrock	---	---	---	---	---	---	---	---	---
Wohly-----------	0-10	Loam------------	CL-ML, ML	A-4	0	80-100	75-100	65-90	50-65	25-35	5-10
	10-26	Clay loam, sandy clay loam, loam.	SC, CL	A-6	0	80-100	75-95	70-90	35-70	30-40	10-20
	26-31	Gravelly clay loam.	GC, CL	A-6	0-5	55-80	50-75	45-70	40-60	30-40	10-20
	31-41	Weathered bedrock	---	---	---	---	---	---	---	---	---
172, 173:											
Irmulco---------	0-6	Loam------------	CL-ML, ML	A-4	0	90-100	85-100	75-95	55-70	25-35	5-10
	6-41	Loam, clay loam, gravelly loam.	GM-GC, GC, CL-ML, CL	A-4, A-6	0	65-100	60-100	50-90	40-75	25-40	5-15
	41-61	Clay loam, gravelly clay loam.	GC, CL	A-6, A-7	0	65-100	60-100	55-90	45-75	30-50	10-25
	61-71	Weathered bedrock	---	---	---	---	---	---	---	---	---
Tramway---------	0-7	Loam------------	CL-ML, ML	A-4	0	90-100	85-100	65-95	50-75	25-35	5-10
	7-12	Loam------------	CL-ML, CL	A-4, A-6	0	90-100	85-100	65-95	50-75	25-40	5-15
	12-28	Clay loam, gravelly clay loam.	CL, GC, SC	A-6, A-7	0	65-100	60-100	55-95	40-80	30-45	10-20
	28-32	Weathered bedrock	---	---	---	---	---	---	---	---	---
174:											
Irmulco---------	0-6	Loam------------	CL-ML, ML	A-4	0	90-100	85-100	75-95	55-70	25-35	5-10
	6-61	Loam, clay loam, gravelly loam.	GM-GC, GC, CL-ML, CL	A-4, A-6	0	65-100	60-100	50-90	40-75	25-40	5-15
	61-65	Weathered bedrock	---	---	---	---	---	---	---	---	---
Tramway---------	0-7	Loam------------	CL-ML, ML	A-4	0	90-100	85-100	65-95	50-75	25-35	5-10
	7-12	Loam------------	CL-ML, CL	A-4, A-6	0	90-100	85-100	65-95	50-75	25-40	5-15
	12-28	Clay loam, gravelly clay loam.	CL, GC, SC	A-6, A-7	0	65-100	60-100	55-95	40-80	30-45	10-20
	28-32	Weathered bedrock	---	---	---	---	---	---	---	---	---

Table 12.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
175, 176---------Iversen	0-7	Loam-------------	ML, CL-ML	A-4	0	95-100	85-100	75-90	55-70	25-35	5-10
	7-10	Clay loam, clay	ML, MH	A-7	0	85-100	75-100	70-95	60-80	40-50	10-20
	10-37	Clay, gravelly clay.	ML, MH	A-7	0	75-100	70-100	65-95	60-90	45-65	15-30
	37-47	Weathered bedrock	---	---	---	---	---	---	---	---	---
177--------------Iversen	0-7	Sandy loam-------	SM	A-4	0	95-100	85-100	60-80	35-50	20-30	NP-5
	7-10	Clay loam, clay	ML, MH	A-7	0	85-100	75-100	70-95	60-80	40-50	10-20
	10-37	Clay, gravelly clay.	ML, MH	A-7	0	75-100	70-100	65-95	60-90	45-65	15-30
	37-47	Weathered bedrock	---	---	---	---	---	---	---	---	---
178:											
Kibesillah------	0-13	Very gravelly loam.	GM-GC, GM	A-2	0-15	40-55	35-50	25-45	20-35	25-35	5-10
	13-19	Very gravelly loam, extremely gravelly loam.	GC	A-2	0-30	20-55	15-50	10-45	10-30	30-35	10-15
	19-26	Very gravelly clay loam, very gravelly sandy clay loam, extremely gravelly clay loam.	GC, GP-GC	A-2	0-15	20-55	15-50	10-45	5-35	30-40	10-20
	26-30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Yellowhound-----	0-15	Gravelly loam----	GM-GC, GM, SC-SM, SM	A-4	0	55-80	50-75	45-65	35-50	25-35	5-10
	15-53	Extremely gravelly loam, very gravelly loam, very gravelly sandy clay loam.	GC	A-2	0-15	25-55	15-50	10-45	10-30	30-35	10-15
	53-57	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
179--------------Littlered	0-10	Clay loam--------	MH	A-7	5-25	100	95-100	90-100	70-80	55-65	15-25
	10-26	Clay loam, clay	MH	A-7	5-25	100	95-100	90-100	70-90	50-65	10-25
	26-65	Loam, clay loam	ML	A-6, A-7	5-25	100	95-100	85-95	60-80	35-50	10-20
180, 181---------Mackerricher	0-12	Sandy loam-------	SM	A-2, A-4	0	100	100	60-80	30-40	20-30	NP-5
	12-62	Loamy sand, sand	SM	A-2	0	90-100	85-100	50-75	10-30	15-25	NP-5
182, 183, 184----Mallopass	0-14	Loam-------------	CL-ML, ML	A-4	0	90-100	85-95	75-85	50-70	25-35	5-10
	14-34	Clay loam, loam, sandy clay loam.	CL	A-6	0	90-100	85-95	80-90	50-70	30-40	10-20
	34-62	Gravelly sandy clay loam, gravelly clay loam, gravelly loam.	SC, SC-SM, GC, GM-GC	A-2, A-4, A-6	0	55-85	50-75	50-70	25-50	25-35	5-15

Table 12.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
185:											
Maymen----------	0-14	Loam------------	ML, SM	A-4	0	80-95	75-95	55-85	40-70	20-35	NP-10
	14-18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Etsel-----------	0-5	Gravelly sandy loam.	SC-SM, GM-GC, GC, SC	A-2, A-4	0-5	55-80	50-75	40-70	25-50	20-30	5-10
	5-14	Very gravelly loam, very gravelly sandy loam.	GM-GC, GC	A-1, A-2	0-5	35-55	30-50	20-45	15-35	20-30	5-10
	14-18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Snook-----------	0-6	Loam------------	ML	A-4	0	80-100	75-95	65-85	50-70	20-35	NP-10
	6-10	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
186:											
Maymen----------	0-14	Loam------------	ML, SM	A-4	0	80-95	75-95	55-85	40-70	20-35	NP-10
	14-18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Woodin----------	0-6	Extremely gravelly sandy loam.	GM, GM-GC	A-1, A-2	0-15	30-55	25-50	15-40	10-30	20-30	NP-10
	6-22	Extremely gravelly loam, very gravelly sandy loam, very gravelly sandy clay loam.	GM, GM-GC	A-2	0-15	30-55	25-50	15-45	10-35	25-35	5-10
	22-26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Etsel-----------	0-5	Gravelly sandy loam.	SC-SM, GM-GC, GC, SC	A-2, A-4	0-5	55-80	50-75	40-70	25-50	20-30	5-10
	5-14	Very gravelly loam, very gravelly sandy loam.	GM-GC, GC	A-1, A-2	0-5	35-55	30-50	20-45	15-35	20-30	5-10
	14-18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
187, 188, 189:											
Ornbaun---------	0-9	Loam------------	CL-ML, ML	A-4	0	100	95-100	80-90	60-75	25-35	5-10
	9-40	Clay loam, loam	CL, CL-ML	A-6, A-4	0	100	95-100	85-95	60-85	25-40	5-15
	40-59	Clay loam--------	CL	A-6, A-7	0-5	80-100	75-95	70-90	60-80	35-50	15-25
	59-63	Weathered bedrock	---	---	---	---	---	---	---	---	---
Zeni------------	0-4	Loam------------	CL-ML, ML	A-4	0	95-100	90-100	80-90	55-70	25-35	5-10
	4-30	Clay loam, sandy clay loam, loam.	CL, SC, CL-ML, SC-SM	A-6, A-4	0	80-100	75-95	60-90	45-75	25-40	5-20
	30-34	Weathered bedrock	---	---	---	---	---	---	---	---	---

Table 12.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
190:											
Pardaloe--------	0-11	Very gravelly loam.	GM, GM-GC	A-1, A-2	0-10	40-55	35-50	20-45	15-35	20-30	NP-10
	11-26	Very gravelly sandy loam, extremely gravelly sandy loam.	GM, GP-GM	A-1	0-10	20-55	15-50	10-30	5-20	20-30	NP-5
	26-54	Very gravelly loam, very gravelly sandy clay loam, extremely gravelly sandy clay loam.	GM, GM-GC, GP-GM	A-2	0-30	20-55	15-50	10-45	5-35	25-35	5-10
	54-58	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Woodin----------	0-6	Extremely gravelly sandy loam.	GM, GM-GC	A-1, A-2	0-15	30-55	25-50	15-40	10-30	20-30	NP-10
	6-22	Extremely gravelly loam, very gravelly sandy loam, very gravelly sandy clay loam.	GM, GM-GC	A-2	0-15	30-55	25-50	15-45	10-35	25-35	5-10
	22-26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
191:											
Pardaloe--------	0-11	Very gravelly loam.	GM, GM-GC	A-1, A-2	0-10	40-55	35-50	20-45	15-35	20-30	NP-10
	11-26	Very gravelly sandy loam, extremely gravelly sandy loam.	GM, GP-GM	A-1	0-10	20-55	15-50	10-30	5-20	20-30	NP-5
	26-54	Very gravelly loam, very gravelly sandy clay loam, extremely gravelly sandy clay loam.	GM, GM-GC, GP-GM	A-2	0-30	20-55	15-50	10-45	5-35	25-35	5-10
	54-58	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Woodin----------	0-6	Extremely gravelly sandy loam.	GM, GM-GC	A-1, A-2	0-15	30-55	25-50	15-40	10-30	20-30	NP-10
	6-22	Extremely gravelly loam, very gravelly sandy loam, very gravelly sandy clay loam.	GM, GM-GC	A-2	0-15	30-55	25-50	15-45	10-35	25-35	5-10
	22-26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

Table 12.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
191:											
Casabonne-------	0-11	Gravelly loam----	GM, SM	A-4	0	65-80	60-75	50-65	40-50	25-35	NP-10
	11-36	Clay loam, sandy clay loam.	CL	A-6	0	80-100	75-95	70-90	50-75	30-40	10-20
	36-49	Gravelly clay loam, gravelly sandy clay loam.	CL, SC, GC	A-6, A-7	0	65-80	60-75	55-70	40-60	30-45	10-25
	49-53	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
192------------- Perrygulch	0-7	Loam------------	CL-ML, ML	A-4	0	90-100	85-100	75-90	50-60	25-35	5-10
	7-16	Sandy clay loam, clay loam.	CL, SC	A-6	0	90-100	85-100	70-90	40-65	30-40	10-20
	16-44	Clay, sandy clay	CL, CH, SC	A-7	0	90-100	85-100	75-95	45-80	40-55	20-30
	44-52	Sandy clay loam, clay loam.	CL, SC	A-6, A-7	0	90-100	85-100	70-90	40-65	30-45	10-20
	52-61	Stratified gravelly sandy clay loam to very gravelly sandy clay loam.	SC, GC	A-2	0	40-65	35-60	30-50	15-35	30-40	10-20
193, 194--------- Pinole	0-10	Loam------------	CL-ML, ML	A-4	0	90-100	85-95	75-85	60-70	25-35	5-10
	10-62	Sandy clay loam, clay loam.	CL, SC	A-6	0	80-100	75-95	65-85	40-65	30-40	10-20
195:											
Pits.											
Dumps.											
196:											
Quinliven-------	0-4	Sandy loam-------	SM	A-2, A-4	0	100	100	60-70	30-45	20-30	NP-5
	4-11	Sandy loam, loam	SM, SC-SM, ML, CL-ML	A-4	0	100	100	65-90	35-60	25-35	5-10
	11-18	Loam, sandy clay loam, clay loam.	CL, SC	A-6	0	100	100	80-95	45-75	25-40	10-20
	18-51	Clay, sandy clay	ML, MH	A-7	0	100	100	85-100	50-95	40-60	10-25
	51-60	Sandy clay loam, clay loam.	SC, CL	A-6	0	100	100	80-100	40-80	30-40	10-20
	60-64	Loamy sand, sandy loam.	SM	A-2, A-4	0	100	100	50-75	20-40	20-30	NP-5
Ferncreek-------	0-7	Sandy loam-------	SM	A-4	0	80-100	75-100	65-75	35-50	20-30	NP-5
	7-33	Clay loam, clay	ML, MH	A-7	0	80-100	75-100	70-90	50-75	40-60	10-25
	33-43	Sandy clay loam	SC, SC-SM	A-4, A-6	0	80-100	75-100	65-80	35-50	25-40	5-15
	43-61	Sandy loam, sandy clay loam.	SC, SC-SM	A-4	0	100	100	60-75	35-50	20-30	5-10
197. Riverwash											
198:											
Seaside---------	0-1	Loamy sand-------	SM	A-2, A-1	0-10	90-100	85-100	45-75	15-30	---	NP
	1-7	Sandy loam-------	SM	A-2, A-4	0-10	95-100	90-100	55-70	25-40	20-30	NP-5
	7-11	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											

Table 12.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
199:											
Shinglemill-----	0-8	Loam-------------	ML	A-4	0	80-95	75-95	70-85	50-65	25-35	NP-10
	8-15	Loam, sandy clay loam.	CL	A-6	0	80-100	75-100	70-85	40-65	30-40	10-15
	15-25	Clay loam, clay	ML, MH	A-7	0	80-100	75-100	75-90	60-80	40-65	10-25
	25-63	Sandy clay, clay	ML, MH	A-7	0	80-100	75-100	65-80	50-80	45-65	15-25
Gibney----------	0-9	Loam-------------	ML, CL-ML	A-4	0	80-100	75-100	70-85	50-65	25-35	5-10
	9-29	Sandy clay loam, clay loam.	CL, SC	A-6	0	80-100	75-100	75-85	40-65	30-40	10-20
	29-55	Clay-------------	ML, MH	A-7	0	80-100	75-100	75-90	50-80	40-60	10-25
	55-63	Sandy clay loam, sandy clay.	SC	A-6, A-7	0	80-100	75-100	65-80	35-50	30-50	10-25
200:											
Shortyork-------	0-4	Loam-------------	CL-ML, ML	A-4	0-5	80-100	75-95	65-75	50-60	25-35	5-10
	4-11	Very cobbly clay loam.	SC, GC	A-6, A-7	30-50	55-75	50-70	45-65	35-50	30-45	10-20
	11-21	Very gravelly clay loam.	GC	A-2, A-6, A-7	0-10	35-50	30-50	25-45	20-40	30-45	10-20
	21-31	Extremely gravelly sandy loam.	GP-GM, GM	A-1	0-20	25-35	15-30	10-20	5-15	20-30	NP-5
	31-35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Tyson-----------	0-4	Gravelly loam----	GM, SM	A-4	0-5	55-80	50-75	40-65	35-50	25-35	NP-10
	4-21	Very gravelly loam, very gravelly clay loam.	GM-GC, GC	A-1, A-2	0-5	35-55	30-50	25-45	20-35	25-40	5-15
	21-25	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Witherell-------	0-1	Loam-------------	CL-ML, ML	A-4	0	80-100	75-95	60-85	50-70	25-35	5-10
	1-12	Loam, gravelly loam, sandy loam.	CL-ML, ML, GM-GC, GM	A-4, A-2	0	65-100	60-95	50-85	30-70	25-35	5-10
	12-16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
201, 202, 203:											
Shortyork-------	0-4	Loam-------------	CL-ML, ML	A-4	0-5	80-100	75-95	65-75	50-60	25-35	5-10
	4-11	Very cobbly clay loam.	SC, GC	A-6, A-7	30-50	55-75	50-70	45-65	35-50	30-45	10-20
	11-21	Very gravelly clay loam.	GC	A-2, A-6, A-7	0-10	35-50	30-50	25-45	20-40	30-45	10-20
	21-31	Extremely gravelly sandy loam.	GP-GM, GM	A-1	0-20	25-35	15-30	10-20	5-15	20-30	NP-5
	31-35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Yorkville-------	0-12	Clay loam--------	CL	A-6, A-7	0	100	95-100	90-95	70-85	30-45	10-20
	12-62	Clay loam, clay	MH, CH	A-7	0	100	100	90-100	75-95	50-60	20-30

Table 12.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
201, 202, 203:											
Witherell	0-1	Loam	CL-ML, ML	A-4	0	80-100	75-95	60-85	50-70	25-35	5-10
	1-12	Loam, gravelly loam, sandy loam.	CL-ML, ML, GM-GC, GM	A-4, A-2	0	65-100	60-95	50-85	30-70	25-35	5-10
	12-16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
204 Sirdrak	0-11	Loamy sand	SM	A-2	0	100	100	50-90	15-30	---	NP
	11-65	Loamy sand, sand	SP-SM, SM	A-2, A-3	0	100	100	50-90	5-30	---	NP
205, 206:											
Squawrock	0-7	Gravelly loam	GM, SM	A-2, A-4, A-1	0-5	55-80	50-75	35-60	20-50	20-35	NP-10
	7-32	Very gravelly sandy clay loam, very gravelly clay loam, very gravelly loam.	GC	A-2	0-5	30-55	25-50	20-45	15-35	30-40	10-15
	32-36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Garcia	0-11	Loam	CL-ML, ML	A-4	0	80-100	75-95	65-85	50-75	25-35	5-10
	11-19	Loam, clay loam	CL	A-6	0	80-90	75-85	65-80	50-65	30-40	10-15
	19-28	Gravelly loam, gravelly clay loam.	CL, SC, GC	A-6	0	60-80	55-75	50-70	35-60	30-40	10-15
	28-32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Witherell	0-1	Loam	CL-ML, ML	A-4	0	80-100	75-95	60-85	50-70	25-35	5-10
	1-12	Loam, gravelly loam, sandy loam.	CL-ML, ML, GM-GC, GM	A-4, A-2	0	65-100	60-95	50-85	30-70	25-35	5-10
	12-16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
207, 208:											
Squawrock	0-7	Gravelly loam	GM, SM	A-2, A-4, A-1	0-5	55-80	50-75	35-60	20-50	20-35	NP-10
	7-32	Very gravelly sandy clay loam, very gravelly clay loam, very gravelly loam.	GC	A-2	0-5	30-55	25-50	20-45	15-35	30-40	10-15
	32-36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Witherell	0-1	Loam	CL-ML, ML	A-4	0	80-100	75-95	60-85	50-70	25-35	5-10
	1-12	Loam, gravelly loam, sandy loam.	CL-ML, ML, GM-GC, GM	A-4, A-2	0	65-100	60-95	50-85	30-70	25-35	5-10
	12-16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
209 Stornetta	0-2	Fine sandy loam	SM	A-4	0	100	100	70-85	35-50	20-30	NP-5
	2-62	Stratified fine sandy loam to silt loam.	CL-ML, ML	A-4	0	100	100	75-95	50-75	25-35	5-10

Table 12.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
210-------------- Talmage	0-12	Gravelly loam----	GM, SM	A-1, A-2, A-4	0-5	55-80	50-75	35-60	20-50	20-25	NP-5
	12-61	Stratified gravelly loam to extremely gravelly coarse sandy loam.	GM, GP-GM	A-1, A-2	0-10	30-55	25-50	15-45	10-35	20-25	NP-5
211:											
Threechop-------	0-8	Loam-------------	CL-ML, ML	A-4	0	90-100	85-100	70-90	55-70	25-35	5-10
	8-12	Clay loam--------	CL	A-6, A-7	0	90-100	85-95	75-95	60-75	30-45	10-20
	12-42	Clay-------------	CL, CH	A-7	0	90-100	85-95	75-95	65-90	45-60	20-30
	42-46	Weathered bedrock	---	---	---	---	---	---	---	---	---
Ornbaun---------	0-9	Loam-------------	CL-ML, ML	A-4	0	100	95-100	80-90	60-75	25-35	5-10
	9-40	Clay loam, loam	CL, CL-ML	A-6, A-4	0	100	95-100	85-95	60-85	25-40	5-15
	40-59	Clay loam--------	CL	A-6, A-7	0-5	80-100	75-95	70-90	60-80	35-50	15-25
	59-63	Weathered bedrock	---	---	---	---	---	---	---	---	---
212, 213:											
Tregoning-------	0-9	Sandy loam-------	SM	A-2, A-4	0	100	100	60-70	30-40	20-30	NP-5
	9-23	Sandy loam, loamy sand.	SM	A-2, A-4	0	100	100	50-75	25-40	20-30	NP-5
	23-62	Cemented---------	---	---	---	---	---	---	---	---	---
Cleone----------	0-3	Loamy sand-------	SM	A-2	0	100	100	50-75	15-30	---	NP
	3-7	Sandy loam-------	SM	A-2	0	85-100	80-100	50-70	25-35	20-30	NP-5
	7-13	Gravelly sandy loam, gravelly loamy sand.	SM, SC-SM	A-2	0	70-85	60-75	40-60	25-35	20-30	NP-10
	13-40	Sandy loam, loamy sand.	SM, SC-SM	A-2, A-4	0	95-100	90-100	50-75	30-50	20-30	NP-10
	40-62	Loamy sand, sand	SM	A-2	0	100	100	50-70	15-30	---	NP
214. Tropaquepts											
215, 216:											
Tyson-----------	0-4	Gravelly loam----	GM, SM	A-4	0-5	55-80	50-75	40-65	35-50	25-35	NP-10
	4-21	Very gravelly loam, very gravelly clay loam.	GM-GC, GC	A-1, A-2	0-5	35-55	30-50	25-45	20-35	25-40	5-15
	21-25	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Updegraff-------	0-4	Loam-------------	CL-ML, ML	A-4	0-10	80-100	75-95	65-80	50-60	25-35	5-10
	4-53	Clay loam--------	CL	A-6, A-7	0-5	80-100	75-95	70-90	55-75	30-45	10-20
	53-57	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
217-------------- Updegraff	0-4	Loam-------------	CL-ML, ML	A-4	0-10	80-100	75-95	65-80	50-60	25-35	5-10
	4-53	Clay loam--------	CL	A-6, A-7	0-5	80-100	75-95	70-90	55-75	30-45	10-20
	53-57	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
218:											
Updegraff-------	0-4	Loam-------------	CL-ML, ML	A-4	0-10	80-100	75-95	65-80	50-60	25-35	5-10
	4-53	Clay loam--------	CL	A-6, A-7	0-5	80-100	75-95	70-90	55-75	30-45	10-20
	53-57	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

Table 12.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
218:											
Hopland---------	0-15	Loam------------	CL-ML, ML	A-4	0	85-100	80-100	65-90	50-70	25-35	5-10
	15-30	Clay loam, loam	CL	A-6	0	80-95	75-90	65-85	50-65	30-40	10-20
	30-34	Weathered bedrock	---	---	---	---	---	---	---	---	---
Woodin----------	0-6	Extremely gravelly sandy loam.	GM, GM-GC	A-1, A-2	0-15	30-55	25-50	15-40	10-30	20-30	NP-10
	6-22	Extremely gravelly loam, very gravelly sandy loam, very gravelly sandy clay loam.	GM, GM-GC	A-2	0-15	30-55	25-50	15-45	10-35	25-35	5-10
	22-26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
219. Urban land											
220:											
Usal-----------	0-14	Gravelly loam----	SC-SM, SM, GM-GC, GM	A-4	0	65-80	60-75	55-65	35-50	25-35	5-10
	14-29	Gravelly clay loam, gravelly loam.	SC, GC, CL	A-6	0	55-80	50-75	40-65	35-55	30-40	10-20
	29-33	Very gravelly clay loam, very gravelly loam.	GC	A-2	0	40-55	35-50	30-40	25-35	30-40	10-20
	33-37	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Branscomb-------	0-10	Very gravelly loam.	GM, GM-GC	A-2	0	45-55	40-50	35-45	25-35	25-35	5-10
	10-50	Very gravelly clay loam, very gravelly loam.	GC	A-2	0-10	35-55	30-50	25-45	15-35	25-40	10-20
	50-54	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
221------------- Vandamme	0-9	Loam------------	CL-ML, ML	A-4	0	95-100	85-95	70-85	55-70	25-35	5-10
	9-42	Clay, clay loam	MH, CH	A-7	0	95-100	85-95	80-90	75-85	50-60	20-30
	42-46	Weathered bedrock	---	---	---	---	---	---	---	---	---
222:											
Vandamme--------	0-9	Sandy loam-------	SM	A-4	0	100	100	60-70	35-50	20-30	NP-5
	9-42	Clay, clay loam	MH, CH	A-7	0	95-100	85-95	80-90	75-85	50-60	20-30
	42-46	Weathered bedrock	---	---	---	---	---	---	---	---	---
Caspar----------	0-16	Sandy loam-------	SM	A-4	0	100	95-100	60-75	35-50	20-30	NP-5
	16-37	Sandy loam, loam, sandy clay loam.	SC-SM, SC	A-4, A-6	0	85-100	75-100	50-85	35-50	25-35	5-15
	37-48	Sandy clay loam, clay loam, sandy clay.	SC, CL	A-6, A-7	0	85-100	75-100	65-90	35-60	30-45	10-20
	48-62	Sandy loam, loamy sand.	SM	A-2	0	100	100	50-70	20-35	20-30	NP-5

Table 12.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
223:											
Vandamme	0-9	Loam	CL-ML, ML	A-4	0	95-100	85-95	70-85	55-70	25-35	5-10
	9-42	Clay, clay loam	MH, CH	A-7	0	95-100	85-95	80-90	75-85	50-60	20-30
	42-46	Weathered bedrock	---	---	---	---	---	---	---	---	---
Irmulco	0-6	Loam	CL-ML, ML	A-4	0	90-100	85-100	75-95	55-70	25-35	5-10
	6-41	Loam, clay loam, gravelly loam.	GM-GC, GC, CL-ML, CL	A-4, A-6	0	65-100	60-100	50-90	40-75	25-40	5-15
	41-61	Clay loam, gravelly clay loam.	GC, CL	A-6, A-7	0	65-100	60-100	55-90	45-75	30-50	10-25
	61-71	Weathered bedrock	---	---	---	---	---	---	---	---	---
224:											
Vandamme	0-9	Loam	CL-ML, ML	A-4	0	95-100	85-95	70-85	55-70	25-35	5-10
	9-42	Clay, clay loam	MH, CH	A-7	0	95-100	85-95	80-90	75-85	50-60	20-30
	42-46	Weathered bedrock	---	---	---	---	---	---	---	---	---
Irmulco	0-6	Loam	CL-ML, ML	A-4	0	90-100	85-100	75-95	55-70	25-35	5-10
	6-61	Loam, clay loam, gravelly loam.	GM-GC, GC, CL-ML, CL	A-4, A-6	0	65-100	60-100	50-90	40-75	25-40	5-15
	61-65	Weathered bedrock	---	---	---	---	---	---	---	---	---
Tramway	0-7	Loam	CL-ML, ML	A-4	0	90-100	85-100	65-95	50-75	25-35	5-10
	7-12	Loam	CL-ML, CL	A-4, A-6	0	90-100	85-100	65-95	50-75	25-40	5-15
	12-28	Clay loam, gravelly clay loam.	CL, GC, SC	A-6, A-7	0	65-100	60-100	55-95	40-80	30-45	10-20
	28-32	Weathered bedrock	---	---	---	---	---	---	---	---	---
225, 226, 227 Windyhollow	0-16	Loam	ML, CL-ML	A-4	0	85-100	75-95	70-85	50-65	25-35	5-10
	16-24	Clay loam	CL	A-6	0	85-100	75-95	65-90	60-70	30-40	10-20
	24-43	Gravelly clay loam.	CL, GC	A-6	0	65-85	55-75	50-70	40-60	30-40	10-20
	43-61	Clay loam, clay	CL	A-6, A-7	0	90-100	80-95	75-90	60-85	30-45	10-20
228:											
Witherell	0-1	Loam	CL-ML, ML	A-4	0	80-100	75-95	60-85	50-70	25-35	5-10
	1-12	Loam, gravelly loam, sandy loam.	CL-ML, ML, GM-GC, GM	A-4, A-2	0	65-100	60-95	50-85	30-70	25-35	5-10
	12-16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Hopland	0-15	Loam	CL-ML, ML	A-4	0	85-100	80-100	65-90	50-70	25-35	5-10
	15-30	Clay loam, loam	CL	A-6	0	80-95	75-90	65-85	50-65	30-40	10-20
	30-34	Weathered bedrock	---	---	---	---	---	---	---	---	---
Squawrock	0-7	Gravelly loam	GM, SM	A-2, A-4, A-1	0-5	55-80	50-75	35-60	20-50	20-35	NP-10
	7-32	Very gravelly sandy clay loam, very gravelly clay loam, very gravelly loam.	GC	A-2	0-5	30-55	25-50	20-45	15-35	30-40	10-15
	32-36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

Table 12.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
229, 230:											
Wolfey----------	0-3	Loam-------------	CL-ML, ML	A-4	0	90-100	85-100	60-85	50-70	25-35	5-10
	3-15	Loam-------------	CL-ML, ML	A-4	0	90-100	85-100	60-85	50-70	25-35	5-10
	15-19	Weathered bedrock	---	---	---	---	---	---	---	---	---
Bearwallow------	0-8	Loam-------------	CL-ML, ML	A-4	0	85-100	75-100	70-90	50-70	25-35	5-10
	8-34	Loam, clay loam	CL	A-6	0	85-100	75-100	70-95	55-75	30-40	10-15
	34-38	Weathered bedrock	---	---	---	---	---	---	---	---	---
231, 232:											
Woodin----------	0-6	Extremely gravelly sandy loam.	GM, GM-GC	A-1, A-2	0-15	30-55	25-50	15-40	10-30	20-30	NP-10
	6-22	Extremely gravelly loam, very gravelly sandy loam, very gravelly sandy clay loam.	GM, GM-GC	A-2	0-15	30-55	25-50	15-45	10-35	25-35	5-10
	22-26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Yellowhound-----	0-15	Gravelly loam----	GM-GC, GM, SC-SM, SM	A-4	0	55-80	50-75	45-65	35-50	25-35	5-10
	15-53	Extremely gravelly loam, very gravelly loam, very gravelly sandy clay loam.	GC	A-2	0-15	25-55	15-50	10-45	10-30	30-35	10-15
	53-57	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
233, 234:											
Xerochrepts.											
Haploxeralfs.											
Argixerolls.											
235:											
Yellowhound-----	0-15	Gravelly loam----	GM-GC, GM, SC-SM, SM	A-4	0	55-80	50-75	45-65	35-50	25-35	5-10
	15-53	Extremely gravelly loam, very gravelly loam, very gravelly sandy clay loam.	GC	A-2	0-15	25-55	15-50	10-45	10-30	30-35	10-15
	53-57	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

Table 12.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
235:											
Kibesillah------	0-13	Very gravelly loam.	GM-GC, GM	A-2	0-15	40-55	35-50	25-45	20-35	25-35	5-10
	13-19	Very gravelly loam, extremely gravelly loam.	GC	A-2	0-30	20-55	15-50	10-45	10-30	30-35	10-15
	19-26	Very gravelly clay loam, very gravelly sandy clay loam, extremely gravelly clay loam.	GC, GP-GC	A-2	0-15	20-55	15-50	10-45	5-35	30-40	10-20
	26-30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
236:											
Yellowhound-----	0-15	Loam-------------	CL-ML, ML	A-4	0	80-90	75-85	65-75	50-60	25-35	5-10
	15-28	Very gravelly loam, extremely gravelly loam.	GC	A-2	0-15	25-55	15-50	10-45	10-30	30-35	10-15
	28-53	Very gravelly sandy clay loam, very gravelly clay loam, extremely gravelly loam.	GC, GP-GC	A-2	0-15	25-55	15-50	10-45	5-30	30-40	10-20
	53-63	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Kibesillah------	0-13	Very gravelly loam.	GM-GC, GM	A-2	0-15	40-55	35-50	25-45	20-35	25-35	5-10
	13-19	Very gravelly loam, extremely gravelly loam.	GC	A-2	0-30	20-55	15-50	10-45	10-30	30-35	10-15
	19-26	Very gravelly clay loam, very gravelly sandy clay loam, extremely gravelly clay loam.	GC, GP-GC	A-2	0-15	20-55	15-50	10-45	5-35	30-40	10-20
	26-30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Ornbaun---------	0-9	Loam-------------	CL-ML, ML	A-4	0	100	95-100	80-90	60-75	25-35	5-10
	9-40	Clay loam, loam	CL, CL-ML	A-6, A-4	0	100	95-100	85-95	60-85	25-40	5-15
	40-59	Clay loam--------	CL	A-6, A-7	0-5	80-100	75-95	70-90	60-80	35-50	15-25
	59-63	Weathered bedrock	---	---	---	---	---	---	---	---	---
237:											
Yellowhound-----	0-15	Gravelly loam----	GM-GC, GM, SC-SM, SM	A-4	0	55-80	50-75	45-65	35-50	25-35	5-10
	15-53	Extremely gravelly loam, very gravelly loam, very gravelly sandy clay loam.	GC	A-2	0-15	25-55	15-50	10-45	10-30	30-35	10-15
	53-57	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

Table 12.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
237:											
Kibesillah	0-13	Very gravelly loam.	GM-GC, GM	A-2	0-15	40-55	35-50	25-45	20-35	25-35	5-10
	13-19	Very gravelly loam, extremely gravelly loam.	GC	A-2	0-30	20-55	15-50	10-45	10-30	30-35	10-15
	19-26	Very gravelly clay loam, very gravelly sandy clay loam, extremely gravelly clay loam.	GC, GP-GC	A-2	0-15	20-55	15-50	10-45	5-35	30-40	10-20
	26-30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Ornbaun	0-9	Loam	CL-ML, ML	A-4	0	100	95-100	80-90	60-75	25-35	5-10
	9-40	Clay loam, loam	CL, CL-ML	A-6, A-4	0	100	95-100	85-95	60-85	25-40	5-15
	40-59	Clay loam	CL	A-6, A-7	0-5	80-100	75-95	70-90	60-80	35-50	15-25
	59-63	Weathered bedrock	---	---	---	---	---	---	---	---	---
238:											
Yellowhound	0-15	Gravelly loam	GM-GC, GM, SC-SM, SM	A-4	0	55-80	50-75	45-65	35-50	25-35	5-10
	15-53	Extremely gravelly loam, very gravelly loam, very gravelly sandy clay loam.	GC	A-2	0-15	25-55	15-50	10-45	10-30	30-35	10-15
	53-57	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Woodin	0-6	Extremely gravelly sandy loam.	GM, GM-GC	A-1, A-2	0-15	30-55	25-50	15-40	10-30	20-30	NP-10
	6-22	Extremely gravelly loam, very gravelly sandy loam, very gravelly sandy clay loam.	GM, GM-GC	A-2	0-15	30-55	25-50	15-45	10-35	25-35	5-10
	22-26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
239:											
Yellowhound	0-15	Loam	CL-ML, ML	A-4	0	80-90	75-85	65-75	50-60	25-35	5-10
	15-28	Very gravelly loam, extremely gravelly loam.	GC	A-2	0-15	25-55	15-50	10-45	10-30	30-35	10-15
	28-53	Very gravelly sandy clay loam, very gravelly clay loam, extremely gravelly loam.	GC, GP-GC	A-2	0-15	25-55	15-50	10-45	5-30	30-40	10-20
	53-63	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

Table 12.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
239:											
Woodin----------	0-6	Gravelly sandy loam.	SM, SC-SM, GM, GM-GC	A-1, A-2	0-15	55-75	50-70	35-55	20-35	20-30	NP-10
	6-22	Extremely gravelly loam, very gravelly sandy loam, very gravelly sandy clay loam.	GM, GM-GC	A-2	0-15	30-55	25-50	15-45	10-35	25-35	5-10
	22-26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Ornbaun---------	0-9	Loam-------------	CL-ML, ML	A-4	0	100	95-100	80-90	60-75	25-35	5-10
	9-40	Clay loam, loam	CL, CL-ML	A-6, A-4	0	100	95-100	85-95	60-85	25-40	5-15
	40-59	Clay loam--------	CL	A-6, A-7	0-5	80-100	75-95	70-90	60-80	35-50	15-25
	59-63	Weathered bedrock	---	---	---	---	---	---	---	---	---
240:											
Yellowhound-----	0-15	Gravelly loam----	GM-GC, GM, SC-SM, SM	A-4	0	55-80	50-75	45-65	35-50	25-35	5-10
	15-53	Extremely gravelly loam, very gravelly loam, very gravelly sandy clay loam.	GC	A-2	0-15	25-55	15-50	10-45	10-30	30-35	10-15
	53-57	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Woodin----------	0-6	Extremely gravelly sandy loam.	GM, GM-GC	A-1, A-2	0-15	30-55	25-50	15-40	10-30	20-30	NP-10
	6-22	Extremely gravelly loam, very gravelly sandy loam, very gravelly sandy clay loam.	GM, GM-GC	A-2	0-15	30-55	25-50	15-45	10-35	25-35	5-10
	22-26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Ornbaun---------	0-9	Loam-------------	CL-ML, ML	A-4	0	100	95-100	80-90	60-75	25-35	5-10
	9-40	Clay loam, loam	CL, CL-ML	A-6, A-4	0	100	95-100	85-95	60-85	25-40	5-15
	40-59	Clay loam--------	CL	A-6, A-7	0-5	80-100	75-95	70-90	60-80	35-50	15-25
	59-63	Weathered bedrock	---	---	---	---	---	---	---	---	---
241:											
Yorkville-------	0-12	Clay loam--------	CL	A-6, A-7	0	100	95-100	90-95	70-85	30-45	10-20
	12-62	Clay loam, clay	MH, CH	A-7	0	100	100	90-100	75-95	50-60	20-30
Hopland---------	0-15	Loam-------------	CL-ML, ML	A-4	0	85-100	80-100	65-90	50-70	25-35	5-10
	15-30	Clay loam, loam	CL	A-6	0	80-95	75-90	65-85	50-65	30-40	10-20
	30-34	Weathered bedrock	---	---	---	---	---	---	---	---	---
242, 243:											
Yorkville-------	0-12	Clay loam--------	CL	A-6, A-7	0	100	95-100	90-95	70-85	30-45	10-20
	12-62	Clay loam, clay	MH, CH	A-7	0	100	100	90-100	75-95	50-60	20-30

Table 12.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
242, 243:											
Squawrock-------	0-7	Gravelly loam----	GM, SM	A-2, A-4, A-1	0-5	55-80	50-75	35-60	20-50	20-35	NP-10
	7-32	Very gravelly sandy clay loam, very gravelly clay loam, very gravelly loam.	GC	A-2	0-5	30-55	25-50	20-45	15-35	30-40	10-15
	32-36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Witherell-------	0-1	Loam-------------	CL-ML, ML	A-4	0	80-100	75-95	60-85	50-70	25-35	5-10
	1-12	Loam, gravelly loam, sandy loam.	CL-ML, ML, GM-GC, GM	A-4, A-2	0	65-100	60-95	50-85	30-70	25-35	5-10
	12-16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
244, 245:											
Yorkville-------	0-12	Clay loam--------	CL	A-6, A-7	0	100	95-100	90-95	70-85	30-45	10-20
	12-62	Clay loam, clay	MH, CH	A-7	0	100	100	90-100	75-95	50-60	20-30
Yorktree--------	0-11	Loam-------------	CL-ML, ML	A-4	0	90-100	85-95	70-90	50-65	25-35	5-10
	11-46	Gravelly loam, gravelly clay loam.	SC, GC	A-6	5-15	60-80	55-75	50-70	35-50	30-40	10-20
	46-58	Gravelly clay loam, gravelly clay.	GC, CL, CH	A-7	0	55-80	50-75	45-70	40-65	40-55	20-30
	58-62	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Squawrock-------	0-7	Gravelly loam----	GM, SM	A-2, A-4, A-1	0-5	55-80	50-75	35-60	20-50	20-35	NP-10
	7-32	Very gravelly sandy clay loam, very gravelly clay loam, very gravelly loam.	GC	A-2	0-5	30-55	25-50	20-45	15-35	30-40	10-15
	32-36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

Table 13.--Physical and Chemical Properties of the Soils

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
101, 102:											
Abalobadiah-----	0-13	15-25	1.35-1.50	2.0-6.0	0.14-0.17	5.6-6.0	Low-------	0.24	3	5	1-7
	13-21	18-35	1.40-1.50	0.6-2.0	0.14-0.17	5.6-6.5	Low-------	0.28			
	21-39	15-25	1.45-1.65	2.0-6.0	0.07-0.11	5.6-6.5	Low-------	0.20			
	39-43	---	---	---	---	---	----------	----			
Bruhel----------	0-4	15-27	1.35-1.50	2.0-6.0	0.14-0.17	5.6-6.5	Low-------	0.24	4	5	3-7
	4-21	20-35	1.40-1.50	0.6-2.0	0.15-0.19	5.6-6.5	Moderate	0.28			
	21-41	20-35	1.40-1.55	0.6-2.0	0.10-0.16	5.6-6.5	Moderate	0.20			
	41-45	---	---	---	---	---	----------	----			
Vizcaino--------	0-2	15-27	1.35-1.55	2.0-6.0	0.14-0.17	5.6-6.0	Low-------	0.24	2	5	3-7
	2-13	20-35	1.45-1.60	0.6-2.0	0.14-0.17	5.6-6.5	Moderate	0.28			
	13-17	20-35	1.50-1.65	0.6-2.0	0.10-0.16	5.6-6.5	Moderate	0.20			
	17-21	---	---	---	---	---	----------	----			
103, 104:											
Bearwallow------	0-8	15-25	1.40-1.50	0.6-2.0	0.14-0.17	5.6-7.3	Low-------	0.32	3	5	1-2
	8-34	20-35	1.40-1.50	0.2-0.6	0.15-0.18	5.1-6.5	Moderate	0.28			
	34-38	---	---	---	---	---	----------	----			
Wolfey----------	0-3	12-20	1.40-1.50	0.6-2.0	0.13-0.16	6.1-7.3	Low-------	0.32	2	5	1-2
	3-15	12-27	1.40-1.50	0.6-2.0	0.13-0.16	5.6-6.5	Low-------	0.32			
	15-19	---	---	---	---	---	----------	----			
105, 106--------- Biaggi	0-23	18-27	1.35-1.50	0.6-2.0	0.14-0.17	4.5-6.5	Low-------	0.32	2	5	3-7
	23-27	---	---	---	---	---	----------	----			
107-------------- Bigriver	0-6	5-10	1.50-1.60	6.0-20	0.06-0.08	5.6-6.5	Low-------	0.20	5	2	1-3
	6-63	5-18	1.45-1.60	2.0-6.0	0.10-0.14	5.6-6.5	Low-------	0.24			
108:											
Blacklock-------	0-7	1-10	1.00-1.20	6.0-20	0.06-0.08	2.0-4.4	Low-------	0.24	1	2	3-6
	7-14	2-12	1.00-1.20	2.0-6.0	0.07-0.12	2.0-4.4	Low-------	0.28			
	14-61	5-15	1.50-1.70	0.00-0.06	0.0-0.0	4.5-5.5	----------	----			
	61-64	1-10	1.20-1.40	6.0-20	0.0-0.0	5.1-5.5	Low-------	0.10			
Aborigine-------	0-6	5-10	1.50-1.60	2.0-6.0	0.08-0.11	4.0-5.5	Low-------	0.37	5	3	1-2
	6-13	15-25	1.45-1.55	0.6-2.0	0.14-0.16	4.0-5.5	Low-------	0.43			
	13-61	35-55	1.35-1.50	0.01-0.06	0.14-0.17	4.0-5.5	Moderate	0.24			
109, 110, 111---- Boontling	0-12	18-25	1.40-1.50	0.6-2.0	0.15-0.17	5.6-6.5	Low-------	0.32	5	5	1-4
	12-30	22-27	1.40-1.50	0.6-2.0	0.13-0.17	5.6-7.3	Low-------	0.32			
	30-40	27-45	1.35-1.45	0.2-0.6	0.15-0.19	5.6-7.3	Moderate	0.28			
	40-60	22-40	1.45-1.55	0.2-0.6	0.12-0.17	5.6-7.3	Moderate	0.17			
112, 113:											
Branscomb-------	0-10	15-27	1.35-1.50	2.0-6.0	0.08-0.11	5.1-6.0	Low-------	0.10	3	7	3-7
	10-50	20-35	1.35-1.50	0.6-2.0	0.07-0.11	4.5-6.0	Moderate	0.10			
	50-54	---	---	---	---	---	----------	----			
Usal------------	0-14	20-27	1.10-1.30	0.6-2.0	0.11-0.14	6.1-7.3	Low-------	0.10	2	7	3-8
	14-29	25-35	1.10-1.35	0.6-2.0	0.10-0.16	6.1-7.3	Moderate	0.20			
	29-33	25-35	1.20-1.35	0.6-2.0	0.08-0.12	6.1-7.3	Low-------	0.15			
	33-37	---	---	---	---	---	----------	----			

Table 13.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
114------------- Bruhel	0-4	15-27	1.35-1.50	2.0-6.0	0.14-0.17	5.6-6.5	Low-------	0.24	4	5	3-7
	4-21	20-35	1.40-1.50	0.6-2.0	0.15-0.19	5.6-6.5	Moderate	0.28			
	21-41	20-35	1.40-1.55	0.6-2.0	0.10-0.16	5.6-6.5	Moderate	0.20			
	41-45	---	---	---	---	---	----------	----			
115:											
Bruhel----------	0-4	15-27	1.35-1.50	2.0-6.0	0.14-0.17	5.6-6.5	Low-------	0.24	4	5	3-7
	4-21	20-35	1.40-1.50	0.6-2.0	0.15-0.19	5.6-6.5	Moderate	0.28			
	21-41	20-35	1.40-1.55	0.6-2.0	0.10-0.16	5.6-6.5	Moderate	0.20			
	41-45	---	---	---	---	---	----------	----			
Abalobadiah-----	0-13	15-25	1.35-1.50	2.0-6.0	0.14-0.17	5.6-6.0	Low-------	0.24	3	5	1-7
	13-21	18-35	1.40-1.50	0.6-2.0	0.14-0.17	5.6-6.5	Low-------	0.28			
	21-39	15-25	1.45-1.65	2.0-6.0	0.07-0.11	5.6-6.5	Low-------	0.20			
	39-43	---	---	---	---	---	----------	----			
Vizcaino--------	0-2	15-27	1.35-1.55	2.0-6.0	0.14-0.17	5.6-6.0	Low-------	0.24	2	5	3-7
	2-13	20-35	1.45-1.60	0.6-2.0	0.14-0.17	5.6-6.5	Moderate	0.28			
	13-17	20-35	1.50-1.65	0.6-2.0	0.10-0.16	5.6-6.5	Moderate	0.20			
	17-21	---	---	---	---	---	----------	----			
116:											
Bruhel----------	0-4	15-27	1.35-1.50	2.0-6.0	0.14-0.17	5.6-6.5	Low-------	0.24	4	5	3-7
	4-21	20-35	1.40-1.50	0.6-2.0	0.15-0.19	5.6-6.5	Moderate	0.28			
	21-41	20-35	1.40-1.55	0.6-2.0	0.10-0.16	5.6-6.5	Moderate	0.20			
	41-45	---	---	---	---	---	----------	----			
Shinglemill-----	0-8	7-20	1.35-1.50	0.6-2.0	0.14-0.17	2.0-5.0	Low-------	0.28	5	5	4-6
	8-15	20-30	1.40-1.55	0.2-0.6	0.14-0.17	2.0-5.0	Moderate	0.32			
	15-25	35-60	1.35-1.50	0.06-0.2	0.15-0.17	2.0-5.0	Moderate	0.24			
	25-63	40-60	1.35-1.50	0.06-0.2	0.14-0.17	2.0-5.0	Moderate	0.24			
117:											
Cabrillo--------	0-26	8-20	1.45-1.55	2.0-6.0	0.11-0.13	4.5-6.0	Low-------	0.24	5	3	3-8
	26-35	20-35	1.40-1.50	0.2-0.6	0.14-0.16	4.5-6.0	Moderate	0.20			
	35-50	25-40	1.35-1.45	0.2-0.6	0.14-0.16	4.5-6.0	Moderate	0.24			
	50-60	8-20	1.50-1.65	2.0-6.0	0.06-0.09	4.5-6.0	Low-------	0.20			
Heeser----------	0-34	6-12	1.45-1.55	2.0-6.0	0.10-0.12	5.1-6.5	Low-------	0.24	3	3	3-8
	34-65	4-10	1.50-1.65	6.0-20	0.07-0.10	5.6-6.5	Low-------	0.20			
118------------- Carlain	0-5	10-20	1.40-1.50	0.6-2.0	0.14-0.18	5.1-6.5	Low-------	0.32	4	5	1-3
	5-29	18-32	1.40-1.55	0.6-2.0	0.14-0.18	5.1-6.0	Moderate	0.37			
	29-61	15-30	1.40-1.55	2.0-6.0	0.05-0.14	5.1-6.0	Low-------	0.15			
119:											
Casabonne-------	0-11	15-27	1.10-1.35	0.6-2.0	0.13-0.16	5.1-6.5	Low-------	0.32	3	6	2-6
	11-49	27-35	1.10-1.40	0.6-2.0	0.15-0.18	5.1-6.5	Moderate	0.32			
	49-53	---	---	---	---	---	----------	----			
Wohly-----------	0-10	15-25	1.40-1.50	0.6-2.0	0.14-0.17	5.6-7.3	Low-------	0.32	3	5	1-2
	10-26	25-35	1.35-1.50	0.6-2.0	0.12-0.19	5.1-7.3	Moderate	0.20			
	26-31	25-35	1.35-1.50	0.6-2.0	0.07-0.09	5.1-7.3	Low-------	0.10			
	31-41	---	---	---	---	---	----------	----			
120:											
Casabonne-------	0-11	15-27	1.10-1.35	0.6-2.0	0.11-0.14	5.1-6.5	Low-------	0.20	3	7	2-6
	11-49	27-35	1.10-1.40	0.6-2.0	0.15-0.18	5.1-6.5	Moderate	0.32			
	49-53	---	---	---	---	---	----------	----			

Table 13.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
120:											
Wohly-----------	0-10	15-25	1.40-1.50	0.6-2.0	0.14-0.17	5.6-7.3	Low-------	0.32	3	5	1-2
	10-26	25-35	1.35-1.50	0.6-2.0	0.12-0.19	5.1-7.3	Moderate	0.20			
	26-31	25-35	1.35-1.50	0.6-2.0	0.07-0.09	5.1-7.3	Low-------	0.10			
	31-41	---	---	---	---	---	----------	----			
121:											
Casabonne-------	0-11	15-27	1.10-1.35	0.6-2.0	0.11-0.14	5.1-6.5	Low-------	0.20	3	7	2-6
	11-49	27-35	1.10-1.40	0.6-2.0	0.15-0.18	5.1-6.5	Moderate	0.32			
	49-53	---	---	---	---	---	----------	----			
Wohly-----------	0-10	15-25	1.40-1.50	0.6-2.0	0.14-0.17	5.6-7.3	Low-------	0.32	3	5	1-2
	10-26	25-35	1.35-1.50	0.6-2.0	0.12-0.19	5.1-7.3	Moderate	0.20			
	26-31	25-35	1.35-1.50	0.6-2.0	0.07-0.09	5.1-7.3	Low-------	0.10			
	31-41	---	---	---	---	---	----------	----			
Pardaloe--------	0-11	15-25	1.40-1.55	2.0-6.0	0.06-0.10	5.6-6.5	Low-------	0.15	3	8	.5-2
	11-26	15-20	1.50-1.60	2.0-6.0	0.05-0.08	5.6-6.5	Low-------	0.05			
	26-54	15-27	1.45-1.55	0.6-2.0	0.06-0.08	5.6-6.5	Low-------	0.05			
	54-58	---	---	---	---	---	----------	----			
122-------------- Caspar	0-16	8-20	1.45-1.60	2.0-6.0	0.10-0.13	4.2-5.0	Low-------	0.32	5	3	1-5
	16-37	15-25	1.50-1.60	0.6-2.0	0.12-0.17	4.2-5.5	Low-------	0.24			
	37-48	25-40	1.40-1.60	0.2-0.6	0.13-0.18	4.2-5.5	Moderate	0.24			
	48-62	5-20	1.50-1.70	2.0-6.0	0.08-0.13	4.2-5.5	Low-------	0.20			
123:											
Caspar----------	0-16	8-20	1.45-1.60	2.0-6.0	0.10-0.13	4.2-5.0	Low-------	0.32	5	3	1-5
	16-37	15-25	1.50-1.60	0.6-2.0	0.12-0.17	4.2-5.5	Low-------	0.24			
	37-48	25-40	1.40-1.60	0.2-0.6	0.13-0.18	4.2-5.5	Moderate	0.24			
	48-62	5-20	1.50-1.70	2.0-6.0	0.08-0.13	4.2-5.5	Low-------	0.20			
Quinliven-------	0-4	5-15	1.45-1.55	2.0-6.0	0.09-0.13	4.5-6.0	Low-------	0.37	5	3	2-5
	4-11	10-20	1.45-1.60	0.6-2.0	0.12-0.16	2.0-5.5	Low-------	0.43			
	11-18	20-35	1.40-1.55	0.2-0.6	0.15-0.19	2.0-5.5	Moderate	0.37			
	18-51	35-60	1.30-1.45	0.06-0.2	0.14-0.17	2.0-5.5	Moderate	0.24			
	51-60	20-35	1.35-1.55	0.2-0.6	0.15-0.20	2.0-5.5	Moderate	0.17			
	60-64	5-20	1.50-1.70	2.0-6.0	0.08-0.13	2.0-5.5	Low-------	0.15			
124:											
Caspar----------	0-16	8-20	1.45-1.60	2.0-6.0	0.10-0.13	4.2-5.0	Low-------	0.32	5	3	1-5
	16-37	15-25	1.50-1.60	0.6-2.0	0.12-0.17	4.2-5.5	Low-------	0.24			
	37-48	25-40	1.40-1.60	0.2-0.6	0.13-0.18	4.2-5.5	Moderate	0.24			
	48-62	5-20	1.50-1.70	2.0-6.0	0.08-0.13	4.2-5.5	Low-------	0.20			
Quinliven-------	0-4	5-15	1.45-1.55	2.0-6.0	0.09-0.13	4.5-6.0	Low-------	0.37	5	3	2-5
	4-11	10-20	1.45-1.60	0.6-2.0	0.12-0.16	2.0-5.5	Low-------	0.43			
	11-18	20-35	1.40-1.55	0.2-0.6	0.15-0.19	2.0-5.5	Moderate	0.37			
	18-51	35-60	1.30-1.45	0.06-0.2	0.14-0.17	2.0-5.5	Moderate	0.24			
	51-60	20-35	1.35-1.55	0.2-0.6	0.15-0.20	2.0-5.5	Moderate	0.17			
	60-64	5-20	1.50-1.70	2.0-6.0	0.08-0.13	2.0-5.5	Low-------	0.15			
Ferncreek-------	0-7	3-15	1.50-1.60	2.0-6.0	0.08-0.13	3.5-5.5	Low-------	0.24	5	3	2-4
	7-33	35-60	1.35-1.50	0.06-0.2	0.15-0.19	3.5-5.5	Moderate	0.24			
	33-43	30-35	1.45-1.55	0.2-0.6	0.14-0.17	3.5-5.5	Moderate	0.17			
	43-61	15-25	1.50-1.60	0.6-2.0	0.12-0.16	3.5-5.5	Low-------	0.20			
125-------------- Cleone	0-3	3-12	1.50-1.60	6.0-20	0.06-0.09	4.2-6.0	Low-------	0.24	4	2	1-4
	3-7	3-15	1.50-1.60	2.0-6.0	0.10-0.13	4.5-6.0	Low-------	0.24			
	7-13	8-18	1.50-1.60	2.0-6.0	0.08-0.11	4.5-6.0	Low-------	0.20			
	13-40	8-18	1.50-1.60	2.0-6.0	0.09-0.13	4.5-6.0	Low-------	0.24			
	40-62	3-10	1.55-1.70	6.0-20	0.05-0.08	5.6-6.5	Low-------	0.17			

Table 13.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
126. Coastal beaches											
127------------- Cole	0-18	22-27	1.40-1.50	0.6-2.0	0.15-0.18	6.1-7.3	Low-------	0.37	5	6	1-4
	18-60	35-50	1.30-1.40	0.06-0.2	0.12-0.17	5.6-7.3	High------	0.32			
128------------- Cole	0-18	18-27	1.40-1.50	0.6-2.0	0.15-0.18	5.6-7.3	Low-------	0.37	5	4	1-4
	18-60	35-50	1.30-1.40	0.06-0.2	0.12-0.17	6.1-7.3	High------	0.32			
129, 130:											
Comptche--------	0-6	18-27	1.35-1.45	2.0-6.0	0.11-0.14	5.6-6.5	Low-------	0.20	3	7	2-10
	6-31	27-40	1.30-1.40	0.6-2.0	0.11-0.15	5.1-6.5	Moderate	0.15			
	31-69	35-50	1.30-1.45	0.2-0.6	0.08-0.13	5.1-6.5	Moderate	0.10			
	69-73	---	---	---	---	---	----------	----			
Zeni-----------	0-4	15-25	1.35-1.50	0.6-2.0	0.14-0.16	5.1-6.5	Low-------	0.32	3	5	1-4
	4-30	20-30	1.40-1.55	0.6-2.0	0.16-0.18	5.1-6.0	Moderate	0.32			
	30-34	---	---	---	---	---	----------	----			
131------------- Cottoneva	0-12	10-20	1.40-1.50	0.6-2.0	0.14-0.17	5.6-6.5	Low-------	0.32	5	3	1-3
	12-43	5-18	1.50-1.60	0.6-2.0	0.12-0.15	5.6-6.5	Low-------	0.32			
	43-63	18-35	1.40-1.55	0.2-0.6	0.15-0.18	5.6-6.5	Moderate	0.32			
132------------- Crispin	0-14	15-20	1.35-1.50	0.6-2.0	0.16-0.18	5.1-6.0	Low-------	0.28	2	5	3-8
	14-23	23-27	1.40-1.50	0.6-2.0	0.16-0.18	5.6-6.0	Low-------	0.32			
	23-62	---	---	---	---	---	----------	----			
133:											
Dann-----------	0-5	27-40	1.10-1.35	0.6-2.0	0.08-0.12	6.1-7.3	Low-------	0.10	2	8	3-5
	5-31	35-50	1.20-1.40	0.2-0.6	0.06-0.10	6.1-7.3	Low-------	0.10			
	31-35	---	---	---	---	---	----------	----			
Hiltabidel------	0-13	27-35	1.00-1.30	0.6-2.0	0.03-0.10	6.1-7.3	Low-------	0.10	1	8	3-5
	13-17	27-35	1.10-1.30	0.6-2.0	0.03-0.08	6.1-7.3	Low-------	0.05			
	17-21	---	---	---	---	---	----------	----			
134:											
Dann-----------	0-5	27-40	1.10-1.35	0.6-2.0	0.08-0.12	6.1-7.3	Low-------	0.10	2	8	3-5
	5-31	35-50	1.20-1.40	0.2-0.6	0.06-0.10	6.1-7.3	Low-------	0.10			
	31-35	---	---	---	---	---	----------	----			
Littlered-------	0-10	27-35	1.00-1.20	2.0-6.0	0.15-0.17	6.1-7.3	Moderate	0.10	5	3	3-5
	10-26	35-45	1.10-1.30	0.6-2.0	0.14-0.16	6.6-7.8	Moderate	0.15			
	26-65	20-40	1.10-1.30	0.6-2.0	0.13-0.16	6.6-7.8	Moderate	0.20			
Hiltabidel------	0-13	27-35	1.00-1.30	0.6-2.0	0.03-0.10	6.1-7.3	Low-------	0.10	1	8	3-5
	13-17	27-35	1.10-1.30	0.6-2.0	0.03-0.08	6.1-7.3	Low-------	0.05			
	17-21	---	---	---	---	---	----------	----			
135, 136:											
Dehaven---------	0-17	15-27	1.10-1.35	2.0-6.0	0.11-0.14	5.6-6.5	Low-------	0.15	3	6	2-8
	17-34	20-35	1.10-1.40	0.6-2.0	0.08-0.11	5.6-6.5	Low-------	0.10			
	34-52	20-35	1.20-1.45	0.6-2.0	0.04-0.07	5.6-6.5	Low-------	0.10			
	52-56	---	---	---	---	---	----------	----			
Hotel-----------	0-8	15-25	1.10-1.30	2.0-6.0	0.08-0.11	5.1-6.5	Low-------	0.15	2	7	1-5
	8-35	25-35	1.10-1.30	0.6-2.0	0.05-0.10	5.1-6.0	Low-------	0.05			
	35-39	---	---	---	---	---	----------	----			

Table 13.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
137:											
Dehaven---------	0-17	15-27	1.10-1.35	2.0-6.0	0.11-0.14	5.6-6.5	Low-------	0.15	3	6	2-8
	17-34	20-35	1.10-1.40	0.6-2.0	0.08-0.11	5.6-6.5	Low-------	0.10			
	34-52	20-35	1.20-1.45	0.6-2.0	0.04-0.07	5.6-6.5	Low-------	0.10			
	52-56	---	---	---	---	---	----------	----			
Hotel-----------	0-8	15-25	1.10-1.30	2.0-6.0	0.08-0.11	5.1-6.5	Low-------	0.15	2	7	1-5
	8-35	25-35	1.10-1.30	0.6-2.0	0.05-0.10	5.1-6.0	Low-------	0.05			
	35-39	---	---	---	---	---	----------	----			
Irmulco---------	0-6	15-25	1.20-1.30	0.6-2.0	0.14-0.16	5.6-6.5	Low-------	0.32	5	5	2-4
	6-41	20-35	1.35-1.55	0.6-2.0	0.12-0.16	4.5-6.0	Moderate	0.28			
	41-61	27-40	1.30-1.45	0.6-2.0	0.12-0.18	4.5-6.0	Moderate	0.28			
	61-71	---	---	---	---	---	----------	----			
138. Duneland											
139. Dystropepts											
140-------------- Feliz	0-27	18-27	1.35-1.50	0.6-2.0	0.15-0.18	5.6-6.5	Low-------	0.32	5	5	1-6
	27-60	20-30	1.35-1.50	0.6-2.0	0.16-0.19	5.6-6.5	Moderate	0.32			
141-------------- Ferncreek	0-7	3-15	1.50-1.60	2.0-6.0	0.08-0.13	3.5-5.5	Low-------	0.24	5	3	2-4
	7-33	35-60	1.35-1.50	0.06-0.2	0.15-0.19	3.5-5.5	Moderate	0.24			
	33-43	30-35	1.45-1.55	0.2-0.6	0.14-0.17	3.5-5.5	Moderate	0.17			
	43-61	15-25	1.50-1.60	0.6-2.0	0.12-0.16	3.5-5.5	Low-------	0.20			
142, 143:											
Fishrock--------	0-2	15-27	1.40-1.50	0.6-2.0	0.14-0.17	4.2-5.0	Low-------	0.37	1	5	1-3
	2-7	27-35	1.35-1.50	0.2-0.6	0.15-0.18	4.2-5.0	Moderate	0.28			
	7-12	40-50	1.30-1.50	0.06-0.2	0.11-0.14	4.2-5.0	Moderate	0.28			
	12-16	---	---	---	---	---	----------	----			
Iversen---------	0-7	18-27	1.40-1.50	0.6-2.0	0.15-0.17	5.6-6.5	Low-------	0.32	3	6	1-2
	7-10	27-50	1.30-1.50	0.2-0.6	0.15-0.19	4.5-5.5	Moderate	0.28			
	10-37	40-60	1.30-1.50	0.06-0.2	0.12-0.16	4.5-5.5	Moderate	0.20			
	37-47	---	---	---	---	---	----------	----			
144, 145--------- Flumeville	0-11	27-35	1.35-1.45	0.2-0.6	0.18-0.20	5.6-7.3	Moderate	0.32	5	4	3-7
	11-62	35-55	1.35-1.50	0.01-0.06	0.14-0.16	4.5-7.3	High------	0.28			
146:											
Garcia----------	0-11	15-25	1.35-1.45	0.6-2.0	0.14-0.16	5.1-6.5	Low-------	0.28	2	5	3-9
	11-19	20-35	1.35-1.50	0.6-2.0	0.15-0.17	5.1-6.5	Moderate	0.28			
	19-28	20-35	1.35-1.50	0.6-2.0	0.12-0.14	5.1-6.5	Low-------	0.20			
	28-32	---	---	---	---	---	----------	----			
Snook-----------	0-6	10-25	1.20-1.40	0.6-2.0	0.13-0.15	5.6-6.5	Low-------	0.32	1	5	.5-2
	6-10	---	---	---	---	---	----------	----			
Gube------------	0-4	18-25	1.40-1.50	0.6-2.0	0.14-0.16	4.5-5.5	Low-------	0.37	3	5	1-2
	4-16	30-40	1.35-1.50	0.2-0.6	0.17-0.19	4.5-5.5	Moderate	0.32			
	16-30	35-45	1.30-1.50	0.06-0.2	0.14-0.17	4.5-5.5	High------	0.32			
	30-34	---	---	---	---	---	----------	----			
147:											
Gibney----------	0-9	7-15	1.35-1.50	0.6-2.0	0.14-0.17	4.1-6.0	Low-------	0.32	5	5	3-6
	9-29	30-40	1.40-1.55	0.2-0.6	0.15-0.19	4.1-5.0	Moderate	0.32			
	29-55	40-60	1.35-1.50	0.06-0.2	0.12-0.16	4.1-5.0	Moderate	0.20			
	55-63	30-50	1.40-1.55	0.2-0.6	0.12-0.16	4.1-5.0	Moderate	0.20			

Table 13.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
147:											
Gibwell---------	0-12	5-15	1.50-1.60	6.0-20	0.07-0.10	4.3-5.5	Low-------	0.24	4	2	1-4
	12-18	25-35	1.40-1.50	0.2-0.6	0.15-0.19	4.3-5.5	Moderate	0.24			
	18-26	35-55	1.35-1.50	0.06-0.2	0.14-0.16	4.3-5.5	Moderate	0.20			
	26-42	25-35	1.40-1.55	0.2-0.6	0.14-0.16	4.3-5.5	Low-------	0.17			
	42-65	5-15	1.50-1.70	6.0-20	0.06-0.10	4.3-5.5	Low-------	0.15			
148, 149--------- Gibwell	0-12	5-15	1.50-1.60	6.0-20	0.07-0.10	4.3-5.5	Low-------	0.24	4	2	1-4
	12-18	25-35	1.40-1.50	0.2-0.6	0.15-0.19	4.3-5.5	Moderate	0.24			
	18-26	35-55	1.35-1.50	0.06-0.2	0.14-0.16	4.3-5.5	Moderate	0.20			
	26-42	25-35	1.40-1.55	0.2-0.6	0.14-0.16	4.3-5.5	Low-------	0.17			
	42-65	5-15	1.50-1.70	6.0-20	0.06-0.10	4.3-5.5	Low-------	0.15			
150, 151, 152---- Glenblair	0-10	18-27	1.10-1.35	2.0-6.0	0.11-0.14	6.1-7.3	Low-------	0.20	3	6	3-10
	10-39	27-35	1.10-1.35	0.6-2.0	0.11-0.15	5.6-6.5	Moderate	0.15			
	39-62	35-45	1.10-1.35	0.2-0.6	0.08-0.13	5.6-6.5	Moderate	0.10			
	62-66	---	---	---	---	---	----------	----			
153:											
Gschwend--------	0-12	10-20	1.35-1.50	0.6-2.0	0.14-0.17	5.1-6.0	Low-------	0.32	4	5	1-4
	12-19	10-27	1.45-1.55	0.6-2.0	0.14-0.17	4.5-5.5	Low-------	0.24			
	19-35	18-30	1.45-1.55	0.6-2.0	0.14-0.17	4.5-6.5	Low-------	0.24			
	35-61	5-27	1.50-1.60	2.0-6.0	0.04-0.09	4.5-5.5	Low-------	0.05			
Frenchman-------	0-10	10-20	1.10-1.40	2.0-6.0	0.05-0.09	5.1-7.3	Low-------	0.10	3	5	1-3
	10-30	10-25	1.20-1.50	0.6-2.0	0.05-0.10	4.5-6.0	Low-------	0.10			
	30-62	5-15	1.30-1.60	6.0-20	0.02-0.05	5.1-6.0	Low-------	0.05			
154:											
Gube------------	0-4	18-25	1.40-1.50	0.6-2.0	0.14-0.16	4.5-5.5	Low-------	0.37	3	5	1-2
	4-16	30-40	1.35-1.50	0.2-0.6	0.17-0.19	4.5-5.5	Moderate	0.32			
	16-30	35-45	1.30-1.50	0.06-0.2	0.14-0.17	4.5-5.5	High------	0.32			
	30-34	---	---	---	---	---	----------	----			
Garcia----------	0-11	15-25	1.35-1.45	0.6-2.0	0.14-0.16	5.1-6.5	Low-------	0.28	2	5	3-9
	11-19	20-35	1.35-1.50	0.6-2.0	0.15-0.17	5.1-6.5	Moderate	0.28			
	19-28	20-35	1.35-1.50	0.6-2.0	0.12-0.14	5.1-6.5	Low-------	0.20			
	28-32	---	---	---	---	---	----------	----			
Snook-----------	0-6	10-25	1.20-1.40	0.6-2.0	0.13-0.15	5.6-6.5	Low-------	0.32	1	5	.5-2
	6-10	---	---	---	---	---	----------	----			
155:											
Haploxeralfs.											
Argixerolls.											
156:											
Haploxeralfs, wet.											
Argixerolls.											
157-------------- Harecreek	0-8	5-13	1.45-1.55	2.0-6.0	0.10-0.13	5.1-6.5	Low-------	0.32	4	3	1-5
	8-16	10-18	1.45-1.55	2.0-6.0	0.10-0.13	5.1-6.5	Low-------	0.32			
	16-43	15-23	1.45-1.60	2.0-6.0	0.12-0.15	5.1-6.5	Low-------	0.32			
	43-60	5-13	1.50-1.70	6.0-20	0.06-0.10	4.5-5.5	Low-------	0.20			
158, 159--------- Havensneck	0-7	10-15	1.45-1.55	6.0-20	0.10-0.13	4.5-5.5	Low-------	0.32	3	3	1-3
	7-21	10-15	1.45-1.60	6.0-20	0.10-0.13	4.0-4.4	Low-------	0.32			
	21-32	18-25	1.45-1.60	0.6-2.0	0.12-0.17	4.0-4.4	Low-------	0.24			
	32-36	---	---	---	---	---	----------	----			

Table 13.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
160:											
Havensneck------	0-7	10-15	1.45-1.55	6.0-20	0.10-0.13	4.5-5.5	Low-------	0.32	3	3	1-3
	7-21	10-15	1.45-1.60	6.0-20	0.10-0.13	4.0-4.4	Low-------	0.32			
	21-32	18-25	1.45-1.60	0.6-2.0	0.12-0.17	4.0-4.4	Low-------	0.24			
	32-36	---	---	---	---	---	----------	----			
Seaside---------	0-1	4-10	1.55-1.70	6.0-20	0.06-0.08	4.3-5.0	Low-------	0.15	1	2	1-3
	1-7	7-12	1.50-1.65	6.0-20	0.10-0.13	4.5-5.0	Low-------	0.20			
	7-11	---	---	---	---	---	----------	----			
161------------- Heeser	0-34	6-12	1.45-1.55	2.0-6.0	0.10-0.12	5.1-6.5	Low-------	0.24	3	3	3-8
	34-65	4-10	1.50-1.65	6.0-20	0.07-0.10	5.6-6.5	Low-------	0.20			
162:											
Hiltabidel------	0-13	27-35	1.00-1.30	0.6-2.0	0.03-0.10	6.1-7.3	Low-------	0.10	1	8	3-5
	13-17	27-35	1.10-1.30	0.6-2.0	0.03-0.08	6.1-7.3	Low-------	0.05			
	17-21	---	---	---	---	---	----------	----			
Dann------------	0-5	27-40	1.10-1.35	0.6-2.0	0.08-0.12	6.1-7.3	Low-------	0.10	2	8	3-5
	5-31	35-50	1.20-1.40	0.2-0.6	0.06-0.10	6.1-7.3	Low-------	0.10			
	31-35	---	---	---	---	---	----------	----			
163:											
Holohan---------	0-4	5-15	1.45-1.55	2.0-6.0	0.03-0.08	5.1-6.0	Low-------	0.10	2	8	1-2
	4-17	18-30	1.35-1.50	0.6-2.0	0.05-0.10	4.5-6.0	Low-------	0.10			
	17-74	5-27	1.50-1.65	6.0-20	0.02-0.06	4.5-6.0	Low-------	0.05			
Hollowtree------	0-6	10-20	1.40-1.50	2.0-6.0	0.09-0.12	5.1-6.5	Low-------	0.10	2	4	1-2
	6-38	15-27	1.30-1.50	0.6-2.0	0.07-0.10	5.1-6.0	Low-------	0.10			
	38-42	---	---	---	---	---	----------	----			
164, 165:											
Holohan---------	0-4	5-15	1.45-1.55	2.0-6.0	0.03-0.08	5.1-6.0	Low-------	0.10	2	8	1-2
	4-17	18-30	1.35-1.50	0.6-2.0	0.05-0.10	4.5-6.0	Low-------	0.10			
	17-74	5-27	1.50-1.65	6.0-20	0.02-0.06	4.5-6.0	Low-------	0.05			
Hollowtree------	0-6	10-20	1.40-1.50	2.0-6.0	0.09-0.12	5.1-6.5	Low-------	0.10	2	4	1-2
	6-38	15-27	1.30-1.50	0.6-2.0	0.07-0.10	5.1-6.0	Low-------	0.10			
	38-42	---	---	---	---	---	----------	----			
Casabonne-------	0-11	15-27	1.10-1.35	0.6-2.0	0.11-0.14	5.1-6.5	Low-------	0.20	3	7	2-6
	11-36	27-35	1.10-1.40	0.6-2.0	0.15-0.18	5.1-6.5	Moderate	0.32			
	36-49	27-40	1.10-1.40	0.6-2.0	0.12-0.15	5.1-6.5	Moderate	0.32			
	49-53	---	---	---	---	---	----------	----			
166, 167--------- Hopland	0-15	15-25	1.40-1.50	0.6-2.0	0.14-0.16	5.6-7.3	Low-------	0.32	3	5	1-5
	15-30	20-35	1.35-1.50	0.2-0.6	0.15-0.18	5.6-6.5	Moderate	0.28			
	30-34	---	---	---	---	---	----------	----			
168:											
Hopland---------	0-15	15-25	1.40-1.50	0.6-2.0	0.14-0.16	5.6-7.3	Low-------	0.32	3	5	1-5
	15-30	20-35	1.35-1.50	0.2-0.6	0.15-0.18	5.6-6.5	Moderate	0.28			
	30-34	---	---	---	---	---	----------	----			
Squawrock-------	0-7	12-25	1.40-1.50	0.6-2.0	0.09-0.12	5.1-7.3	Low-------	0.20	2	5	1-2
	7-16	20-35	1.35-1.50	0.6-2.0	0.07-0.11	5.1-6.5	Moderate	0.10			
	16-21	20-35	1.35-1.50	0.6-2.0	0.07-0.11	5.1-6.5	Moderate	0.10			
	21-25	---	---	---	---	---	----------	----			
169:											
Hopland---------	0-15	15-25	1.40-1.50	0.6-2.0	0.14-0.16	5.6-7.3	Low-------	0.32	3	5	1-5
	15-30	20-35	1.35-1.50	0.2-0.6	0.15-0.18	5.6-6.5	Moderate	0.28			
	30-34	---	---	---	---	---	----------	----			

Table 13.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
169:											
Witherell-------	0-1	15-27	1.40-1.50	0.6-2.0	0.13-0.16	5.1-6.0	Low-------	0.32	1	5	.5-2
	1-12	12-27	1.45-1.55	0.6-2.0	0.10-0.16	4.5-6.0	Low-------	0.24			
	12-16	---	---	---	---	---	----------	----			
Squawrock-------	0-7	12-25	1.40-1.50	0.6-2.0	0.09-0.12	5.1-7.3	Low-------	0.20	2	5	1-2
	7-32	20-35	1.35-1.50	0.6-2.0	0.07-0.11	5.1-6.5	Moderate	0.10			
	32-36	---	---	---	---	---	----------	----			
170, 171:											
Hopland---------	0-15	15-25	1.40-1.50	0.6-2.0	0.14-0.16	5.6-7.3	Low-------	0.32	3	5	1-5
	15-30	20-35	1.35-1.50	0.2-0.6	0.15-0.18	5.6-6.5	Moderate	0.28			
	30-34	---	---	---	---	---	----------	----			
Wohly-----------	0-10	15-25	1.40-1.50	0.6-2.0	0.14-0.17	5.6-7.3	Low-------	0.32	3	5	1-2
	10-26	25-35	1.35-1.50	0.6-2.0	0.12-0.19	5.1-7.3	Moderate	0.20			
	26-31	25-35	1.35-1.50	0.6-2.0	0.07-0.09	5.1-7.3	Low-------	0.10			
	31-41	---	---	---	---	---	----------	----			
172, 173:											
Irmulco---------	0-6	15-25	1.20-1.30	0.6-2.0	0.14-0.16	5.6-6.5	Low-------	0.32	5	5	2-4
	6-41	20-35	1.35-1.55	0.6-2.0	0.12-0.16	4.5-6.0	Moderate	0.28			
	41-61	27-40	1.30-1.45	0.6-2.0	0.12-0.18	4.5-6.0	Moderate	0.28			
	61-71	---	---	---	---	---	----------	----			
Tramway---------	0-7	15-20	1.25-1.40	0.6-2.0	0.13-0.16	5.1-6.5	Low-------	0.32	3	5	1-2
	7-12	20-27	1.30-1.45	0.6-2.0	0.13-0.16	5.1-6.5	Low-------	0.32			
	12-28	27-40	1.30-1.40	0.6-2.0	0.14-0.19	5.1-6.5	Moderate	0.28			
	28-32	---	---	---	---	---	----------	----			
174:											
Irmulco---------	0-6	15-25	1.20-1.30	0.6-2.0	0.14-0.16	5.6-6.5	Low-------	0.32	5	5	2-4
	6-61	20-35	1.35-1.55	0.6-2.0	0.12-0.16	4.5-6.0	Moderate	0.28			
	61-65	---	---	---	---	---	----------	----			
Tramway---------	0-7	15-20	1.25-1.40	0.6-2.0	0.13-0.16	5.1-6.5	Low-------	0.32	3	5	1-2
	7-12	20-27	1.30-1.45	0.6-2.0	0.13-0.16	5.1-6.5	Low-------	0.32			
	12-28	27-40	1.30-1.40	0.6-2.0	0.14-0.19	5.1-6.5	Moderate	0.28			
	28-32	---	---	---	---	---	----------	----			
175, 176--------- Iversen	0-7	18-27	1.40-1.50	0.6-2.0	0.15-0.17	5.6-6.5	Low-------	0.32	3	6	1-2
	7-10	27-50	1.30-1.50	0.2-0.6	0.15-0.19	4.5-5.5	Moderate	0.28			
	10-37	40-60	1.30-1.50	0.06-0.2	0.12-0.16	4.5-5.5	Moderate	0.20			
	37-47	---	---	---	---	---	----------	----			
177-------------- Iversen	0-7	10-20	1.45-1.55	2.0-6.0	0.11-0.13	5.6-6.5	Low-------	0.24	3	3	1-2
	7-10	27-50	1.30-1.50	0.2-0.6	0.15-0.19	4.5-5.5	Moderate	0.28			
	10-37	40-60	1.30-1.50	0.06-0.2	0.12-0.16	4.5-5.5	Moderate	0.20			
	37-47	---	---	---	---	---	----------	----			
178:											
Kibesillah------	0-13	15-20	1.10-1.35	0.6-2.0	0.09-0.11	5.1-7.3	Low-------	0.15	2	7	1-2
	13-19	20-27	1.20-1.35	0.6-2.0	0.05-0.09	5.1-6.0	Low-------	0.15			
	19-26	25-35	1.20-1.40	0.6-2.0	0.04-0.06	5.1-6.0	Low-------	0.10			
	26-30	---	---	---	---	---	----------	----			
Yellowhound-----	0-15	10-20	1.20-1.40	0.6-2.0	0.11-0.12	5.1-6.5	Low-------	0.20	3	6	1-3
	15-28	15-27	1.25-1.45	0.6-2.0	0.03-0.10	5.1-6.5	Low-------	0.15			
	28-53	20-30	1.35-1.50	0.6-2.0	0.04-0.10	5.1-6.5	Low-------	0.10			
	53-57	---	---	---	---	---	----------	----			

Table 13.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
179-------------- Littlered	0-10	27-35	1.00-1.20	2.0-6.0	0.15-0.17	6.1-7.3	Moderate	0.10	5	3	3-5
	10-26	35-45	1.10-1.30	0.6-2.0	0.14-0.16	6.6-7.8	Moderate	0.15			
	26-65	20-40	1.10-1.30	0.6-2.0	0.13-0.16	6.6-7.8	Moderate	0.20			
180, 181--------- Mackerricher	0-12	6-12	1.40-1.50	2.0-6.0	0.10-0.13	5.6-7.3	Low--------	0.24	2	3	2-7
	12-62	2-12	1.50-1.70	6.0-20	0.05-0.08	5.6-6.5	Low--------	0.20			
182, 183, 184---- Mallopass	0-14	20-27	1.35-1.45	2.0-6.0	0.15-0.18	5.6-6.5	Low--------	0.28	5	5	3-7
	14-34	25-35	1.35-1.50	0.2-0.6	0.15-0.19	6.1-7.3	Moderate	0.32			
	34-62	25-30	1.35-1.50	0.2-0.6	0.10-0.16	6.1-7.3	Moderate	0.20			
185:											
Maymen----------	0-14	10-25	1.45-1.55	0.6-2.0	0.10-0.15	4.5-6.5	Low--------	0.24	1	3	.5-1
	14-18	---	---	---	---	---	-----------	----			
Etsel-----------	0-5	12-18	1.35-1.50	0.6-2.0	0.06-0.13	5.1-6.5	Low--------	0.20	1	6	1-2
	5-14	12-18	1.35-1.50	0.6-2.0	0.04-0.10	5.1-6.5	Low--------	0.10			
	14-18	---	---	---	---	---	-----------	----			
Snook-----------	0-6	10-25	1.20-1.40	0.6-2.0	0.13-0.15	5.6-6.5	Low--------	0.32	1	5	.5-2
	6-10	---	---	---	---	---	-----------	----			
186:											
Maymen----------	0-14	10-25	1.45-1.55	0.6-2.0	0.10-0.15	4.5-6.5	Low--------	0.24	1	3	.5-1
	14-18	---	---	---	---	---	-----------	----			
Woodin----------	0-6	15-25	1.20-1.40	2.0-6.0	0.05-0.08	4.5-7.3	Low--------	0.15	2	8	2-4
	6-22	15-25	1.35-1.50	0.6-2.0	0.05-0.08	4.5-7.3	Low--------	0.10			
	22-26	---	---	---	---	---	-----------	----			
Etsel-----------	0-5	12-18	1.35-1.50	0.6-2.0	0.06-0.13	5.1-6.5	Low--------	0.20	1	6	1-2
	5-14	12-18	1.35-1.50	0.6-2.0	0.04-0.10	5.1-6.5	Low--------	0.10			
	14-18	---	---	---	---	---	-----------	----			
187, 188, 189:											
Ornbaun---------	0-9	15-25	1.40-1.50	0.6-2.0	0.14-0.16	5.1-6.5	Low--------	0.32	4	5	2-4
	9-40	20-35	1.40-1.50	0.6-2.0	0.17-0.18	5.1-6.0	Moderate	0.32			
	40-59	27-40	1.35-1.45	0.6-2.0	0.15-0.17	4.5-5.5	Moderate	0.24			
	59-63	---	---	---	---	---	-----------	----			
Zeni------------	0-4	15-25	1.35-1.50	0.6-2.0	0.14-0.16	5.1-6.5	Low--------	0.32	3	5	1-4
	4-30	20-30	1.40-1.55	0.6-2.0	0.16-0.18	5.1-6.0	Moderate	0.32			
	30-34	---	---	---	---	---	-----------	----			
190:											
Pardaloe--------	0-11	15-25	1.40-1.55	2.0-6.0	0.06-0.10	5.6-6.5	Low--------	0.15	3	8	.5-2
	11-26	15-20	1.50-1.60	2.0-6.0	0.05-0.08	5.6-6.5	Low--------	0.05			
	26-54	15-27	1.45-1.55	0.6-2.0	0.06-0.08	5.6-6.5	Low--------	0.05			
	54-58	---	---	---	---	---	-----------	----			
Woodin----------	0-6	15-25	1.20-1.40	2.0-6.0	0.05-0.08	4.5-7.3	Low--------	0.15	2	8	2-4
	6-22	15-25	1.35-1.50	0.6-2.0	0.05-0.08	4.5-7.3	Low--------	0.10			
	22-26	---	---	---	---	---	-----------	----			
191:											
Pardaloe--------	0-11	15-25	1.40-1.55	2.0-6.0	0.06-0.10	5.6-6.5	Low--------	0.15	3	8	.5-2
	11-26	15-20	1.50-1.60	2.0-6.0	0.05-0.08	5.6-6.5	Low--------	0.05			
	26-54	15-27	1.45-1.55	0.6-2.0	0.06-0.08	5.6-6.5	Low--------	0.05			
	54-58	---	---	---	---	---	-----------	----			

Table 13.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
191:											
Woodin----------	0-6	15-25	1.20-1.40	2.0-6.0	0.05-0.08	4.5-7.3	Low-------	0.15	2	8	2-4
	6-22	15-25	1.35-1.50	0.6-2.0	0.05-0.08	4.5-7.3	Low-------	0.10			
	22-26	---	---	---	---	---	----------	----			
Casabonne-------	0-11	15-27	1.10-1.35	0.6-2.0	0.11-0.14	5.1-6.5	Low-------	0.20	3	7	2-6
	11-36	27-35	1.10-1.40	0.6-2.0	0.15-0.18	5.1-6.5	Moderate	0.32			
	36-49	27-40	1.10-1.40	0.6-2.0	0.12-0.15	5.1-6.5	Moderate	0.32			
	49-53	---	---	---	---	---	----------	----			
192------------- Perrygulch	0-7	15-27	1.40-1.50	0.6-2.0	0.15-0.17	4.5-6.0	Low-------	0.32	4	5	1-5
	7-16	27-35	1.35-1.50	0.2-0.6	0.16-0.18	4.5-5.0	Moderate	0.28			
	16-44	35-50	1.30-1.50	0.06-0.2	0.14-0.16	4.5-5.0	High------	0.24			
	44-52	27-40	1.35-1.55	0.2-0.6	0.16-0.18	5.1-5.5	Moderate	0.28			
	52-61	25-30	1.45-1.55	0.2-0.6	0.08-0.11	5.6-6.5	Moderate	0.15			
193, 194--------- Pinole	0-10	15-27	1.35-1.50	0.6-2.0	0.14-0.17	5.6-6.5	Low-------	0.32	5	5	1-4
	10-62	25-35	1.35-1.50	0.2-0.6	0.15-0.19	5.6-6.5	Moderate	0.24			
195:											
Pits.											
Dumps.											
196:											
Quinliven-------	0-4	5-15	1.45-1.55	2.0-6.0	0.09-0.13	4.5-6.0	Low-------	0.37	5	3	2-5
	4-11	10-20	1.45-1.60	0.6-2.0	0.12-0.16	2.0-5.5	Low-------	0.43			
	11-18	20-35	1.40-1.55	0.2-0.6	0.15-0.19	2.0-5.5	Moderate	0.37			
	18-51	35-60	1.30-1.45	0.06-0.2	0.14-0.17	2.0-5.5	Moderate	0.24			
	51-60	20-35	1.35-1.55	0.2-0.6	0.15-0.20	2.0-5.5	Moderate	0.17			
	60-64	5-20	1.50-1.70	2.0-6.0	0.08-0.13	2.0-5.5	Low-------	0.15			
Ferncreek-------	0-7	3-15	1.50-1.60	2.0-6.0	0.08-0.13	3.5-5.5	Low-------	0.24	5	3	2-4
	7-33	35-60	1.35-1.50	0.06-0.2	0.15-0.19	3.5-5.5	Moderate	0.24			
	33-43	30-35	1.45-1.55	0.2-0.6	0.14-0.17	3.5-5.5	Moderate	0.17			
	43-61	15-25	1.50-1.60	0.6-2.0	0.12-0.16	3.5-5.5	Low-------	0.20			
197. Riverwash											
198:											
Seaside---------	0-1	4-10	1.55-1.70	6.0-20	0.06-0.08	4.3-5.0	Low-------	0.15	1	2	1-3
	1-7	7-12	1.50-1.65	6.0-20	0.10-0.13	4.5-5.0	Low-------	0.20			
	7-11	---	---	---	---	---	----------	----			
Rock outcrop.											
199:											
Shinglemill-----	0-8	7-20	1.35-1.50	0.6-2.0	0.14-0.17	3.5-5.0	Low-------	0.28	5	5	4-6
	8-15	20-30	1.40-1.55	0.2-0.6	0.14-0.17	3.5-5.0	Moderate	0.32			
	15-25	35-60	1.35-1.50	0.06-0.2	0.15-0.17	3.5-5.0	Moderate	0.24			
	25-63	40-60	1.35-1.50	0.06-0.2	0.14-0.17	3.5-5.0	Moderate	0.24			
Gibney----------	0-9	7-15	1.35-1.50	0.6-2.0	0.14-0.17	4.5-6.0	Low-------	0.32	5	5	3-6
	9-29	30-40	1.40-1.55	0.2-0.6	0.15-0.19	4.1-5.0	Moderate	0.32			
	29-55	40-60	1.35-1.50	0.06-0.2	0.12-0.16	4.1-5.0	Moderate	0.20			
	55-63	30-50	1.40-1.55	0.2-0.6	0.12-0.16	4.1-5.0	Moderate	0.20			

Table 13.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
200:											
Shortyork-------	0-4	20-27	1.40-1.50	0.6-2.0	0.14-0.17	5.6-6.5	Low-------	0.32	2	6	1-3
	4-11	27-35	1.35-1.50	0.2-0.6	0.08-0.13	5.1-6.5	Moderate	0.10			
	11-21	27-35	1.35-1.50	0.2-0.6	0.08-0.12	5.1-6.5	Moderate	0.10			
	21-31	10-20	1.50-1.60	2.0-6.0	0.02-0.05	5.1-6.0	Low-------	0.10			
	31-35	---	---	---	---	---	----------	----			
Tyson-----------	0-4	18-27	1.20-1.40	0.6-2.0	0.10-0.15	5.6-7.3	Low-------	0.20	2	7	2-10
	4-21	20-30	1.30-1.50	0.6-2.0	0.07-0.12	4.5-6.0	Low-------	0.10			
	21-25	---	---	---	---	---	----------	----			
Witherell-------	0-1	15-27	1.40-1.50	0.6-2.0	0.13-0.16	5.1-6.0	Low-------	0.32	1	5	.5-2
	1-12	12-27	1.45-1.55	0.6-2.0	0.10-0.16	4.5-6.0	Low-------	0.24			
	12-16	---	---	---	---	---	----------	----			
201, 202, 203:											
Shortyork-------	0-4	20-27	1.40-1.50	0.6-2.0	0.14-0.17	5.6-6.5	Low-------	0.32	2	6	1-3
	4-11	27-35	1.35-1.50	0.2-0.6	0.08-0.13	5.1-6.5	Moderate	0.10			
	11-21	27-35	1.35-1.50	0.2-0.6	0.08-0.12	5.1-6.5	Moderate	0.10			
	21-31	10-20	1.50-1.60	2.0-6.0	0.02-0.05	5.1-6.0	Low-------	0.10			
	31-35	---	---	---	---	---	----------	----			
Yorkville-------	0-12	27-32	1.35-1.50	0.2-0.6	0.17-0.18	5.6-7.3	Moderate	0.32	5	4	1-4
	12-62	35-50	1.35-1.50	0.01-0.06	0.15-0.18	6.6-8.4	High------	0.24			
Witherell-------	0-1	15-27	1.40-1.50	0.6-2.0	0.13-0.16	5.1-6.0	Low-------	0.32	1	5	.5-2
	1-12	12-27	1.45-1.55	0.6-2.0	0.10-0.16	4.5-6.0	Low-------	0.24			
	12-16	---	---	---	---	---	----------	----			
204-------------- Sirdrak	0-11	0-5	1.60-1.70	6.0-20	0.07-0.10	5.1-6.5	Low-------	0.15	5	2	1-5
	11-65	0-5	1.60-1.70	6.0-20	0.07-0.10	5.1-6.5	Low-------	0.15			
205, 206:											
Squawrock-------	0-7	12-25	1.40-1.50	0.6-2.0	0.09-0.12	5.1-7.3	Low-------	0.20	2	5	1-2
	7-32	20-35	1.35-1.50	0.6-2.0	0.07-0.11	5.1-6.5	Moderate	0.10			
	32-36	---	---	---	---	---	----------	----			
Garcia----------	0-11	15-25	1.35-1.45	0.6-2.0	0.14-0.16	5.1-6.5	Low-------	0.28	2	5	3-9
	11-19	20-35	1.35-1.50	0.6-2.0	0.15-0.17	5.1-6.5	Moderate	0.28			
	19-28	20-35	1.35-1.50	0.6-2.0	0.12-0.14	5.1-6.5	Low-------	0.20			
	28-32	---	---	---	---	---	----------	----			
Witherell-------	0-1	15-27	1.40-1.50	0.6-2.0	0.13-0.16	5.1-6.0	Low-------	0.32	1	5	.5-2
	1-12	12-27	1.45-1.55	0.6-2.0	0.10-0.16	4.5-6.0	Low-------	0.24			
	12-16	---	---	---	---	---	----------	----			
207, 208:											
Squawrock-------	0-7	12-25	1.40-1.50	0.6-2.0	0.09-0.12	5.1-7.3	Low-------	0.20	2	5	1-2
	7-32	20-35	1.35-1.50	0.6-2.0	0.07-0.11	5.1-6.5	Moderate	0.10			
	32-36	---	---	---	---	---	----------	----			
Witherell-------	0-1	15-27	1.40-1.50	0.6-2.0	0.13-0.16	5.1-6.0	Low-------	0.32	1	5	.5-2
	1-12	12-27	1.45-1.55	0.6-2.0	0.10-0.16	4.5-6.0	Low-------	0.24			
	12-16	---	---	---	---	---	----------	----			
209-------------- Stornetta	0-2	10-20	1.45-1.55	2.0-6.0	0.13-0.15	6.6-7.8	Low-------	0.32	5	3	1-3
	2-62	18-27	1.50-1.60	0.6-2.0	0.15-0.18	6.1-7.3	Low-------	0.32			
210-------------- Talmage	0-12	8-18	1.40-1.55	2.0-6.0	0.07-0.12	5.6-6.5	Low-------	0.20	3	6	1-3
	12-61	8-18	1.40-1.60	2.0-6.0	0.04-0.07	4.5-5.5	Low-------	0.10			

Table 13.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
211:											
Threechop-------	0-8	18-27	1.00-1.20	2.0-6.0	0.15-0.17	5.1-6.0	Low-------	0.24	4	5	3-8
	8-12	27-40	1.25-1.35	0.6-2.0	0.16-0.19	5.1-6.0	Moderate	0.24			
	12-42	40-60	1.25-1.35	0.2-0.6	0.14-0.16	4.5-5.5	Moderate	0.20			
	42-46	---	---	---	---	---	----------	----			
Ornbaun---------	0-9	15-25	1.40-1.50	0.6-2.0	0.14-0.16	5.1-6.5	Low-------	0.32	4	5	2-4
	9-40	20-35	1.40-1.50	0.6-2.0	0.17-0.18	5.1-6.0	Moderate	0.32			
	40-59	27-40	1.35-1.45	0.6-2.0	0.15-0.17	4.5-5.5	Moderate	0.24			
	59-63	---	---	---	---	---	----------	----			
212, 213:											
Tregoning-------	0-9	5-12	1.45-1.55	2.0-6.0	0.10-0.13	3.5-5.0	Low-------	0.32	2	3	2-4
	9-23	3-12	1.50-1.65	2.0-6.0	0.07-0.12	3.5-5.0	Low-------	0.24			
	23-62	---	---	---	---	---	----------	----			
Cleone----------	0-3	3-12	1.50-1.60	6.0-20	0.06-0.09	4.2-6.0	Low-------	0.24	4	2	1-4
	3-7	10-15	1.50-1.60	2.0-6.0	0.10-0.13	4.5-6.0	Low-------	0.24			
	7-13	8-18	1.50-1.60	2.0-6.0	0.08-0.11	4.5-6.0	Low-------	0.20			
	13-40	8-18	1.50-1.60	2.0-6.0	0.09-0.13	4.5-6.0	Low-------	0.24			
	40-62	3-10	1.55-1.70	6.0-20	0.05-0.08	5.6-6.5	Low-------	0.17			
214. Tropaquepts											
215, 216:											
Tyson-----------	0-4	18-27	1.20-1.40	0.6-2.0	0.10-0.15	5.6-7.3	Low-------	0.20	2	7	2-10
	4-21	20-30	1.30-1.50	0.6-2.0	0.07-0.12	4.5-6.0	Low-------	0.10			
	21-25	---	---	---	---	---	----------	----			
Updegraff-------	0-4	15-27	1.30-1.45	0.6-2.0	0.14-0.16	5.6-6.5	Low-------	0.32	3	5	1-5
	4-53	27-40	1.35-1.50	0.2-0.6	0.15-0.18	5.6-6.5	Moderate	0.32			
	53-57	---	---	---	---	---	----------	----			
217-------------- Updegraff	0-4	15-27	1.30-1.45	0.6-2.0	0.14-0.16	5.6-6.5	Low-------	0.32	3	5	1-5
	4-53	27-40	1.35-1.50	0.2-0.6	0.15-0.18	5.6-6.5	Moderate	0.32			
	53-57	---	---	---	---	---	----------	----			
218:											
Updegraff-------	0-4	15-27	1.30-1.45	0.6-2.0	0.14-0.16	5.6-6.5	Low-------	0.32	3	5	1-5
	4-53	27-40	1.35-1.50	0.2-0.6	0.15-0.18	5.6-6.5	Moderate	0.32			
	53-57	---	---	---	---	---	----------	----			
Hopland---------	0-15	15-25	1.40-1.50	0.6-2.0	0.14-0.16	5.6-7.3	Low-------	0.32	3	5	1-5
	15-30	20-35	1.35-1.50	0.2-0.6	0.15-0.18	5.6-6.5	Moderate	0.28			
	30-34	---	---	---	---	---	----------	----			
Woodin----------	0-6	15-25	1.20-1.40	2.0-6.0	0.05-0.08	4.5-7.3	Low-------	0.15	2	8	2-4
	6-22	15-25	1.35-1.50	0.6-2.0	0.05-0.08	4.5-7.3	Low-------	0.10			
	22-26	---	---	---	---	---	----------	----			
219. Urban land											
220:											
Usal------------	0-14	20-27	1.10-1.30	0.6-2.0	0.11-0.14	6.1-7.3	Low-------	0.10	2	7	3-8
	14-29	25-35	1.10-1.35	0.6-2.0	0.10-0.16	6.1-7.3	Moderate	0.20			
	29-33	25-35	1.20-1.35	0.6-2.0	0.08-0.12	6.1-7.3	Low-------	0.15			
	33-37	---	---	---	---	---	----------	----			
Branscomb-------	0-10	15-27	1.35-1.50	2.0-6.0	0.08-0.11	5.1-6.0	Low-------	0.10	3	7	3-7
	10-50	20-35	1.35-1.50	0.6-2.0	0.07-0.11	4.5-6.0	Moderate	0.10			
	50-54	---	---	---	---	---	----------	----			

Table 13.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
221-------------- Vandamme	0-9	20-27	1.10-1.25	0.6-2.0	0.14-0.16	4.5-6.0	Low-------	0.32	4	5	3-8
	9-42	35-50	1.20-1.40	0.06-0.2	0.14-0.16	4.5-5.5	Moderate	0.24			
	42-46	---	---	---	---	---	----------	----			
222:											
Vandamme--------	0-9	10-20	1.15-1.30	2.0-6.0	0.08-0.13	4.5-5.5	Low-------	0.20	4	3	2-5
	9-42	35-50	1.20-1.40	0.06-0.2	0.14-0.16	4.5-5.5	Moderate	0.24			
	42-46	---	---	---	---	---	----------	----			
Caspar----------	0-16	8-20	1.45-1.60	2.0-6.0	0.10-0.13	4.2-5.0	Low-------	0.32	5	3	1-5
	16-37	15-25	1.50-1.60	0.6-2.0	0.12-0.17	4.2-5.5	Low-------	0.24			
	37-48	25-40	1.40-1.60	0.2-0.6	0.13-0.18	4.2-5.5	Moderate	0.24			
	48-62	5-20	1.50-1.70	2.0-6.0	0.08-0.13	4.2-5.5	Low-------	0.20			
223:											
Vandamme--------	0-9	20-27	1.10-1.25	0.6-2.0	0.14-0.16	4.5-6.0	Low-------	0.32	4	5	3-8
	9-42	35-50	1.20-1.40	0.06-0.2	0.14-0.16	4.5-5.5	Moderate	0.24			
	42-46	---	---	---	---	---	----------	----			
Irmulco---------	0-6	15-25	1.20-1.30	0.6-2.0	0.14-0.16	5.6-6.5	Low-------	0.32	5	5	2-4
	6-41	20-35	1.35-1.55	0.6-2.0	0.12-0.16	4.5-6.0	Moderate	0.28			
	41-61	27-40	1.30-1.45	0.6-2.0	0.12-0.18	4.5-6.0	Moderate	0.28			
	61-71	---	---	---	---	---	----------	----			
224:											
Vandamme--------	0-9	20-27	1.10-1.25	0.6-2.0	0.14-0.16	4.5-6.0	Low-------	0.32	4	5	3-8
	9-42	35-50	1.20-1.40	0.06-0.2	0.14-0.16	4.5-5.5	Moderate	0.24			
	42-46	---	---	---	---	---	----------	----			
Irmulco---------	0-6	15-25	1.20-1.30	0.6-2.0	0.14-0.16	5.6-6.5	Low-------	0.32	5	5	2-4
	6-61	20-35	1.35-1.55	0.6-2.0	0.12-0.16	4.5-6.0	Moderate	0.28			
	61-65	---	---	---	---	---	----------	----			
Tramway---------	0-7	15-20	1.25-1.40	0.6-2.0	0.13-0.16	5.1-6.5	Low-------	0.32	3	5	1-2
	7-12	20-27	1.30-1.45	0.6-2.0	0.13-0.16	5.1-6.5	Low-------	0.32			
	12-28	27-40	1.30-1.40	0.6-2.0	0.14-0.19	5.1-6.5	Moderate	0.28			
	28-32	---	---	---	---	---	----------	----			
225, 226, 227---- Windyhollow	0-16	20-27	1.35-1.45	0.6-2.0	0.14-0.17	5.1-6.0	Low-------	0.24	5	6	1-6
	16-24	27-35	1.35-1.50	0.2-0.6	0.15-0.18	5.6-6.5	Moderate	0.24			
	24-43	27-35	1.35-1.50	0.2-0.6	0.12-0.16	5.6-6.5	Moderate	0.20			
	43-61	30-45	1.30-1.50	0.2-0.6	0.14-0.17	5.6-6.5	Moderate	0.28			
228:											
Witherell-------	0-1	15-27	1.40-1.50	0.6-2.0	0.13-0.16	5.1-6.0	Low-------	0.32	1	5	.5-2
	1-12	12-27	1.45-1.55	0.6-2.0	0.10-0.16	4.5-6.0	Low-------	0.24			
	12-16	---	---	---	---	---	----------	----			
Hopland---------	0-15	15-25	1.40-1.50	0.6-2.0	0.14-0.16	5.6-7.3	Low-------	0.32	3	5	1-5
	15-30	20-35	1.35-1.50	0.2-0.6	0.15-0.18	5.6-6.5	Moderate	0.28			
	30-34	---	---	---	---	---	----------	----			
Squawrock-------	0-7	12-25	1.40-1.50	0.6-2.0	0.09-0.12	5.1-7.3	Low-------	0.20	2	5	1-2
	7-32	20-35	1.35-1.50	0.6-2.0	0.07-0.11	5.1-6.5	Moderate	0.10			
	32-36	---	---	---	---	---	----------	----			
229, 230:											
Wolfey----------	0-3	12-20	1.40-1.50	0.6-2.0	0.13-0.16	6.1-7.3	Low-------	0.32	2	5	1-2
	3-15	12-27	1.40-1.50	0.6-2.0	0.13-0.16	5.6-6.5	Low-------	0.32			
	15-19	---	---	---	---	---	----------	----			

Table 13.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
229, 230:											
Bearwallow------	0-8	15-25	1.40-1.50	0.6-2.0	0.14-0.17	5.6-7.3	Low-------	0.32	3	5	1-2
	8-34	20-35	1.40-1.50	0.2-0.6	0.15-0.18	5.1-6.5	Moderate	0.28			
	34-38	---	---	---	---	---	----------	----			
231, 232:											
Woodin----------	0-6	15-25	1.20-1.40	2.0-6.0	0.05-0.08	4.5-7.3	Low-------	0.15	2	8	2-4
	6-22	15-25	1.35-1.50	0.6-2.0	0.05-0.08	4.5-7.3	Low-------	0.10			
	22-26	---	---	---	---	---	----------	----			
Yellowhound-----	0-15	10-20	1.20-1.40	0.6-2.0	0.11-0.12	5.1-6.5	Low-------	0.20	3	6	1-3
	15-53	15-27	1.25-1.45	0.6-2.0	0.03-0.10	5.1-6.5	Low-------	0.15			
	53-57	---	---	---	---	---	----------	----			
233, 234:											
Xerochrepts.											
Haploxeralfs.											
Argixerolls.											
235:											
Yellowhound-----	0-15	10-20	1.20-1.40	0.6-2.0	0.11-0.12	5.1-6.5	Low-------	0.20	3	6	1-3
	15-53	15-27	1.25-1.45	0.6-2.0	0.03-0.10	5.1-6.5	Low-------	0.15			
	53-57	---	---	---	---	---	----------	----			
Kibesillah------	0-13	15-20	1.10-1.35	0.6-2.0	0.09-0.11	5.1-7.3	Low-------	0.15	2	7	1-2
	13-19	20-27	1.20-1.35	0.6-2.0	0.05-0.09	5.1-6.0	Low-------	0.15			
	19-26	25-35	1.20-1.40	0.6-2.0	0.04-0.06	5.1-6.0	Low-------	0.10			
	26-30	---	---	---	---	---	----------	----			
236:											
Yellowhound-----	0-15	10-20	1.20-1.40	0.6-2.0	0.13-0.15	5.1-6.5	Low-------	0.32	3	5	1-3
	15-28	15-27	1.25-1.45	0.6-2.0	0.03-0.10	5.1-6.5	Low-------	0.15			
	28-53	20-30	1.30-1.50	0.6-2.0	0.04-0.10	5.1-6.5	Low-------	0.10			
	53-63	---	---	---	---	---	----------	----			
Kibesillah------	0-13	15-20	1.10-1.35	0.6-2.0	0.09-0.11	5.1-7.3	Low-------	0.15	2	7	1-2
	13-19	20-27	1.20-1.35	0.6-2.0	0.05-0.09	5.1-6.0	Low-------	0.15			
	19-26	25-35	1.20-1.40	0.6-2.0	0.04-0.06	5.1-6.0	Low-------	0.10			
	26-30	---	---	---	---	---	----------	----			
Ornbaun---------	0-9	15-25	1.40-1.50	0.6-2.0	0.14-0.16	5.1-6.5	Low-------	0.32	4	5	2-4
	9-40	20-35	1.40-1.50	0.6-2.0	0.17-0.18	5.1-6.0	Moderate	0.32			
	40-59	27-40	1.35-1.45	0.6-2.0	0.15-0.17	4.5-5.5	Moderate	0.24			
	59-63	---	---	---	---	---	----------	----			
237:											
Yellowhound-----	0-15	10-20	1.20-1.40	0.6-2.0	0.11-0.12	5.1-6.5	Low-------	0.20	3	6	1-3
	15-53	15-27	1.25-1.45	0.6-2.0	0.03-0.10	5.1-6.5	Low-------	0.15			
	53-57	---	---	---	---	---	----------	----			
Kibesillah------	0-13	15-20	1.10-1.35	0.6-2.0	0.09-0.11	5.1-7.3	Low-------	0.15	2	7	1-2
	13-19	20-27	1.20-1.35	0.6-2.0	0.05-0.09	5.1-6.0	Low-------	0.15			
	19-26	25-35	1.20-1.40	0.6-2.0	0.04-0.06	5.1-6.0	Low-------	0.10			
	26-30	---	---	---	---	---	----------	----			
Ornbaun---------	0-9	15-25	1.40-1.50	0.6-2.0	0.14-0.16	5.1-6.5	Low-------	0.32	4	5	2-4
	9-40	20-35	1.40-1.50	0.6-2.0	0.17-0.18	5.1-6.0	Moderate	0.32			
	40-59	27-40	1.35-1.45	0.6-2.0	0.15-0.17	4.5-5.5	Moderate	0.24			
	59-63	---	---	---	---	---	----------	----			

Table 13.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
238:											
Yellowhound-----	0-15	10-20	1.20-1.40	0.6-2.0	0.11-0.12	5.1-6.5	Low-------	0.20	3	6	1-3
	15-53	15-27	1.25-1.45	0.6-2.0	0.03-0.10	5.1-6.5	Low-------	0.15			
	53-57	---	---	---	---	---	----------	----			
Woodin----------	0-6	15-25	1.20-1.40	2.0-6.0	0.05-0.08	4.5-7.3	Low-------	0.15	2	8	2-4
	6-22	15-25	1.35-1.50	0.6-2.0	0.05-0.08	4.5-7.3	Low-------	0.10			
	22-26	---	---	---	---	---	----------	----			
239:											
Yellowhound-----	0-15	10-20	1.20-1.40	0.6-2.0	0.13-0.15	5.1-6.5	Low-------	0.32	3	5	1-3
	15-28	15-27	1.25-1.45	0.6-2.0	0.03-0.10	5.1-6.5	Low-------	0.15			
	28-53	20-30	1.30-1.50	0.6-2.0	0.04-0.10	5.1-6.5	Low-------	0.10			
	53-63	---	---	---	---	---	----------	----			
Woodin----------	0-6	15-25	1.20-1.40	2.0-6.0	0.08-0.11	4.5-7.3	Low-------	0.20	2	6	2-4
	6-22	15-25	1.35-1.50	0.6-2.0	0.05-0.08	4.5-7.3	Low-------	0.10			
	22-26	---	---	---	---	---	----------	----			
Ornbaun---------	0-9	15-25	1.40-1.50	0.6-2.0	0.14-0.16	5.1-6.5	Low-------	0.32	4	5	2-4
	9-40	20-35	1.40-1.50	0.6-2.0	0.17-0.18	5.1-6.0	Moderate	0.32			
	40-59	27-40	1.35-1.45	0.6-2.0	0.15-0.17	4.5-5.5	Moderate	0.24			
	59-63	---	---	---	---	---	----------	----			
240:											
Yellowhound-----	0-15	10-20	1.20-1.40	0.6-2.0	0.11-0.12	5.1-6.5	Low-------	0.20	3	6	1-3
	15-53	15-27	1.25-1.45	0.6-2.0	0.03-0.10	5.1-6.5	Low-------	0.15			
	53-57	---	---	---	---	---	----------	----			
Woodin----------	0-6	15-25	1.20-1.40	2.0-6.0	0.05-0.08	4.5-7.3	Low-------	0.15	2	8	2-4
	6-22	15-25	1.35-1.50	0.6-2.0	0.05-0.08	4.5-7.3	Low-------	0.10			
	22-26	---	---	---	---	---	----------	----			
Ornbaun---------	0-9	15-25	1.40-1.50	0.6-2.0	0.14-0.16	5.1-6.5	Low-------	0.32	4	5	2-4
	9-40	20-35	1.40-1.50	0.6-2.0	0.17-0.18	5.1-6.0	Moderate	0.32			
	40-59	27-40	1.35-1.45	0.6-2.0	0.15-0.17	4.5-5.5	Moderate	0.24			
	59-63	---	---	---	---	---	----------	----			
241:											
Yorkville-------	0-12	27-32	1.35-1.50	0.2-0.6	0.17-0.18	5.6-7.3	Moderate	0.32	5	4	1-4
	12-62	35-50	1.35-1.50	0.01-0.06	0.15-0.18	6.6-8.4	High------	0.24			
Hopland---------	0-15	15-25	1.40-1.50	0.6-2.0	0.14-0.16	5.6-7.3	Low-------	0.32	3	5	1-5
	15-30	20-35	1.35-1.50	0.2-0.6	0.15-0.18	5.6-6.5	Moderate	0.28			
	30-34	---	---	---	---	---	----------	----			
242, 243:											
Yorkville-------	0-12	27-32	1.35-1.50	0.2-0.6	0.17-0.18	5.6-7.3	Moderate	0.32	5	4	1-4
	12-62	35-50	1.35-1.50	0.01-0.06	0.15-0.18	6.6-8.4	High------	0.24			
Squawrock-------	0-7	12-25	1.40-1.50	0.6-2.0	0.09-0.12	5.1-7.3	Low-------	0.20	2	5	1-2
	7-32	20-35	1.35-1.50	0.6-2.0	0.07-0.11	5.1-6.5	Moderate	0.10			
	32-36	---	---	---	---	---	----------	----			
Witherell-------	0-1	15-27	1.40-1.50	0.6-2.0	0.13-0.16	5.1-6.0	Low-------	0.32	1	5	.5-2
	1-12	12-27	1.45-1.55	0.6-2.0	0.10-0.16	4.5-6.0	Low-------	0.24			
	12-16	---	---	---	---	---	----------	----			
244, 245:											
Yorkville-------	0-12	27-32	1.35-1.50	0.2-0.6	0.17-0.18	5.6-7.3	Moderate	0.32	5	4	1-4
	12-62	35-50	1.35-1.50	0.01-0.06	0.15-0.18	6.6-8.4	High------	0.24			

Table 13.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
244, 245:											
Yorktree--------	0-11	20-27	1.35-1.50	0.6-2.0	0.15-0.17	5.6-7.3	Low-------	0.32	3	6	1-5
	11-46	24-35	1.35-1.50	0.2-0.6	0.12-0.15	5.6-7.3	Moderate	0.24			
	46-58	35-50	1.35-1.50	0.06-0.2	0.10-0.13	5.6-7.3	High------	0.20			
	58-62	---	---	---	---	---	----------	----			
Squawrock-------	0-7	12-25	1.40-1.50	0.6-2.0	0.09-0.12	5.1-7.3	Low-------	0.20	2	5	1-2
	7-32	20-35	1.35-1.50	0.6-2.0	0.07-0.11	5.1-6.5	Moderate	0.10			
	32-36	---	---	---	---	---	----------	----			

Table 14.--Water Features

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months
					Ft		
101, 102:							
Abalobadiah	B	None	---	---	>6.0	---	---
Bruhel	B	None	---	---	>6.0	---	---
Vizcaino	D	None	---	---	>6.0	---	---
103, 104:							
Bearwallow	C	None	---	---	>6.0	---	---
Wolfey	C	None	---	---	>6.0	---	---
105, 106 Biaggi	B	None	---	---	>6.0	---	---
107 Bigriver	B	Frequent	Brief	Dec-Apr	>6.0	---	---
108:							
Blacklock	D	None	---	---	0-2.0	Perched	Dec-Apr
Aborigine	D	None	---	---	0-1.0	Apparent	Dec-Apr
109, 110, 111 Boontling	C	None	---	---	2.5-3.5	Apparent	Dec-May
112, 113:							
Branscomb	B	None	---	---	>6.0	---	---
Usal	C	None	---	---	>6.0	---	---
114 Bruhel	B	None	---	---	>6.0	---	---
115:							
Bruhel	B	None	---	---	>6.0	---	---
Abalobadiah	B	None	---	---	>6.0	---	---
Vizcaino	D	None	---	---	>6.0	---	---
116:							
Bruhel	B	None	---	---	>6.0	---	---
Shinglemill	D	None	---	---	1.0-2.5	Apparent	Dec-Apr
117:							
Cabrillo	C	None	---	---	2.5-4.0	Apparent	Dec-Apr
Heeser	B	None	---	---	>6.0	---	---
118 Carlain	B	None	---	---	>6.0	---	---
119, 120:							
Casabonne	B	None	---	---	>6.0	---	---

Table 14.--Water Features--Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months
					Ft		
119, 120:							
Wohly	B	None	---	---	>6.0	---	---
121:							
Casabonne	B	None	---	---	>6.0	---	---
Wohly	B	None	---	---	>6.0	---	---
Pardaloe	B	None	---	---	>6.0	---	---
122 Caspar	B	None	---	---	>6.0	---	---
123:							
Caspar	B	None	---	---	>6.0	---	---
Quinliven	C	None	---	---	4.0-6.0	Apparent	Dec-Apr
124:							
Caspar	B	None	---	---	>6.0	---	---
Quinliven	C	None	---	---	4.0-6.0	Apparent	Dec-Apr
Ferncreek	D	None	---	---	2.0-4.0	Apparent	Dec-Apr
125 Cleone	B	None	---	---	2.5-4.0	Apparent	Dec-Apr
126. Coastal beaches							
127 Cole	C	None	---	---	2.5-3.5	Apparent	Nov-May
128 Cole	C	None	---	---	>6.0	---	---
129, 130:							
Comptche	B	None	---	---	>6.0	---	---
Zeni	C	None	---	---	>6.0	---	---
131 Cottoneva	C	Frequent	Brief	Dec-Apr	2.5-4.0	Apparent	Dec-Apr
132 Crispin	C	None	---	---	>6.0	---	---
133:							
Dann	C	None	---	---	>6.0	---	---
Hiltabidel	D	None	---	---	>6.0	---	---
134:							
Dann	C	None	---	---	>6.0	---	---
Littlered	B	None	---	---	>6.0	---	---
Hiltabidel	D	None	---	---	>6.0	---	---

Table 14.--Water Features--Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months
					Ft		
135, 136:							
Dehaven	B	None	---	---	>6.0	---	---
Hotel	C	None	---	---	>6.0	---	---
137:							
Dehaven	B	None	---	---	>6.0	---	---
Hotel	C	None	---	---	>6.0	---	---
Irmulco	B	None	---	---	>6.0	---	---
138. Duneland							
139. Dystropepts							
140 Feliz	B	Rare	---	---	>6.0	---	---
141 Ferncreek	D	None	---	---	2.5-4.0	Apparent	Dec-Apr
142, 143:							
Fishrock	D	None	---	---	>6.0	---	---
Iversen	C	None	---	---	>6.0	---	---
144, 145 Flumeville	D	None	---	---	1.0-2.5	Apparent	Dec-Apr
146:							
Garcia	C	None	---	---	>6.0	---	---
Snook	D	None	---	---	>6.0	---	---
Gube	C	None	---	---	>6.0	---	---
147:							
Gibney	C	None	---	---	2.5-4.0	Apparent	Dec-Apr
Gibwell	C	None	---	---	>6.0	---	---
148, 149 Gibwell	C	None	---	---	>6.0	---	---
150, 151, 152 Glenblair	C	None	---	---	>6.0	---	---
153:							
Gschwend	B	None	---	---	>6.0	---	---
Frenchman	B	None	---	---	>6.0	---	---
154:							
Gube	C	None	---	---	>6.0	---	---
Garcia	C	None	---	---	>6.0	---	---
Snook	D	None	---	---	>6.0	---	---

Table 14.--Water Features--Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months
					Ft		
155:							
Haploxeralfs.							
Argixerolls.							
156:							
Haploxeralfs, wet.							
Argixerolls.							
157 Harecreek	B	None	---	---	>6.0	---	---
158, 159 Havensneck	B	None	---	---	>6.0	---	---
160:							
Havensneck	B	None	---	---	>6.0	---	---
Seaside	D	None	---	---	>6.0	---	---
161 Heeser	B	None	---	---	>6.0	---	---
162:							
Hiltabidel	D	None	---	---	>6.0	---	---
Dann	C	None	---	---	>6.0	---	---
163:							
Holohan	B	None	---	---	>6.0	---	---
Hollowtree	C	None	---	---	>6.0	---	---
164, 165:							
Holohan	B	None	---	---	>6.0	---	---
Hollowtree	C	None	---	---	>6.0	---	---
Casabonne	B	None	---	---	>6.0	---	---
166, 167 Hopland	B	None	---	---	>6.0	---	---
168:							
Hopland	B	None	---	---	>6.0	---	---
Squawrock	C	None	---	---	>6.0	---	---
169:							
Hopland	B	None	---	---	>6.0	---	---
Witherell	D	None	---	---	>6.0	---	---
Squawrock	C	None	---	---	>6.0	---	---
170, 171:							
Hopland	B	None	---	---	>6.0	---	---
Wohly	B	None	---	---	>6.0	---	---

Table 14.--Water Features--Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months
					Ft		
172, 173, 174:							
Irmulco	B	None	---	---	>6.0	---	---
Tramway	B	None	---	---	>6.0	---	---
175, 176, 177 Iversen	C	None	---	---	>6.0	---	---
178:							
Kibesillah	C	None	---	---	>6.0	---	---
Yellowhound	B	None	---	---	>6.0	---	---
179 Littlered	B	None	---	---	>6.0	---	---
180, 181 Mackerricher	A	None	---	---	>6.0	---	---
182, 183, 184 Mallopass	B	None	---	---	4.0-5.0	Apparent	Dec-Apr
185:							
Maymen	D	None	---	---	>6.0	---	---
Etsel	D	None	---	---	>6.0	---	---
Snook	D	None	---	---	>6.0	---	---
186:							
Maymen	D	None	---	---	>6.0	---	---
Woodin	C	None	---	---	>6.0	---	---
Etsel	D	None	---	---	>6.0	---	---
187, 188, 189:							
Ornbaun	B	None	---	---	>6.0	---	---
Zeni	C	None	---	---	>6.0	---	---
190:							
Pardaloe	B	None	---	---	>6.0	---	---
Woodin	C	None	---	---	>6.0	---	---
191:							
Pardaloe	B	None	---	---	>6.0	---	---
Woodin	C	None	---	---	>6.0	---	---
Casabonne	B	None	---	---	>6.0	---	---
192 Perrygulch	D	None	---	---	0-1.0	Apparent	Dec-Apr
193, 194 Pinole	B	None	---	---	>6.0	---	---
195:							
Pits.							

Table 14.--Water Features--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
195:							
Dumps.							
196:							
Quinliven	C	None	---	---	4.0-6.0	Apparent	Dec-Apr
Ferncreek	D	None	---	---	2.5-4.0	Apparent	Dec-Apr
197.							
Riverwash							
198:							
Seaside	D	None	---	---	>6.0	---	---
Rock outcrop.							
199:							
Shinglemill	D	None	---	---	1.0-2.5	Apparent	Dec-Apr
Gibney	C	None	---	---	2.5-4.0	Apparent	Dec-Apr
200:							
Shortyork	C	None	---	---	>6.0	---	---
Tyson	B	None	---	---	>6.0	---	---
Witherell	D	None	---	---	>6.0	---	---
201, 202, 203:							
Shortyork	C	None	---	---	>6.0	---	---
Yorkville	D	None	---	---	0-1.0	Apparent	Dec-Apr
Witherell	D	None	---	---	>6.0	---	---
204	A	None	---	---	>6.0	---	---
Sirdrak							
205, 206:							
Squawrock	C	None	---	---	>6.0	---	---
Garcia	C	None	---	---	>6.0	---	---
Witherell	D	None	---	---	>6.0	---	---
207, 208:							
Squawrock	C	None	---	---	>6.0	---	---
Witherell	D	None	---	---	>6.0	---	---
209	D	Frequent	Long	Dec-Apr	0.5-1.0	Apparent	Dec-Apr
Stornetta							
210	B	Rare	---	---	>6.0	---	---
Talmage							
211:							
Threechop	B	None	---	---	>6.0	---	---
Ornbaun	B	None	---	---	>6.0	---	---

Table 14.--Water Features--Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months
					Ft		
212, 213:							
Tregoning	C	None	---	---	1.0-2.5	Perched	Dec-Apr
Cleone	B	None	---	---	2.5-4.0	Apparent	Dec-Apr
214. Tropaquepts							
215, 216:							
Tyson	B	None	---	---	>6.0	---	---
Updegraff	B	None	---	---	>6.0	---	---
217 Updegraff	B	None	---	---	>6.0	---	---
218:							
Updegraff	B	None	---	---	>6.0	---	---
Hopland	B	None	---	---	>6.0	---	---
Woodin	C	None	---	---	>6.0	---	---
219. Urban land							
220:							
Usal	C	None	---	---	>6.0	---	---
Branscomb	B	None	---	---	>6.0	---	---
221 Vandamme	B	None	---	---	>6.0	---	---
222:							
Vandamme	B	None	---	---	>6.0	---	---
Caspar	B	None	---	---	>6.0	---	---
223:							
Vandamme	B	None	---	---	>6.0	---	---
Irmulco	B	None	---	---	>6.0	---	---
224:							
Vandamme	B	None	---	---	>6.0	---	---
Irmulco	B	None	---	---	>6.0	---	---
Tramway	B	None	---	---	>6.0	---	---
225, 226, 227 Windyhollow	C	None	---	---	2.5-4.0	Apparent	Dec-Apr
228:							
Witherell	D	None	---	---	>6.0	---	---
Hopland	B	None	---	---	>6.0	---	---
Squawrock	C	None	---	---	>6.0	---	---

Table 14.--Water Features--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
229, 230:							
Wolfey	C	None	---	---	>6.0	---	---
Bearwallow	C	None	---	---	>6.0	---	---
231, 232:							
Woodin	C	None	---	---	>6.0	---	---
Yellowhound	B	None	---	---	>6.0	---	---
233, 234:							
Xerochrepts.							
Haploxeralfs.							
Argixerolls.							
235:							
Yellowhound	B	None	---	---	>6.0	---	---
Kibesillah	C	None	---	---	>6.0	---	---
236, 237:							
Yellowhound	B	None	---	---	>6.0	---	---
Kibesillah	C	None	---	---	>6.0	---	---
Ornbaun	B	None	---	---	>6.0	---	---
238:							
Yellowhound	B	None	---	---	>6.0	---	---
Woodin	C	None	---	---	>6.0	---	---
239, 240:							
Yellowhound	B	None	---	---	>6.0	---	---
Woodin	C	None	---	---	>6.0	---	---
Ornbaun	B	None	---	---	>6.0	---	---
241:							
Yorkville	D	None	---	---	0-1.0	Apparent	Dec-Apr
Hopland	B	None	---	---	>6.0	---	---
242, 243:							
Yorkville	D	None	---	---	0-1.0	Apparent	Dec-Apr
Squawrock	C	None	---	---	>6.0	---	---
Witherell	D	None	---	---	>6.0	---	---
244, 245:							
Yorkville	D	None	---	---	0-1.0	Apparent	Dec-Apr
Yorktree	C	None	---	---	>6.0	---	---
Squawrock	C	None	---	---	>6.0	---	---

Table 15.--Soil Features

(The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Bedrock		Cemented pan		Risk of corrosion	
	Depth	Hardness	Depth	Hardness	Uncoated steel	Concrete
	In		In			
101, 102:						
Abalobadiah	20-40	Soft	---	---	Moderate	Moderate.
Bruhel	40-60	Soft	---	---	Moderate	Moderate.
Vizcaino	12-20	Soft	---	---	Moderate	Moderate.
103, 104:						
Bearwallow	20-40	Soft	---	---	Moderate	Moderate.
Wolfey	10-20	Soft	---	---	Low	Low.
105, 106 Biaggi	20-40	Hard	---	---	Moderate	Moderate.
107 Bigriver	>60	---	---	---	Moderate	Moderate.
108:						
Blacklock	>60	---	12-20	Thick	High	High.
Aborigine	>60	---	---	---	High	High.
109, 110, 111 Boontling	>60	---	---	---	Moderate	Moderate.
112, 113:						
Branscomb	40-60	Hard	---	---	Moderate	Moderate.
Usal	20-40	Hard	---	---	Moderate	Low.
114 Bruhel	40-60	Soft	---	---	Moderate	Moderate.
115:						
Bruhel	40-60	Soft	---	---	Moderate	Moderate.
Abalobadiah	20-40	Soft	---	---	Moderate	Moderate.
Vizcaino	12-20	Soft	---	---	Moderate	Moderate.
116:						
Bruhel	40-60	Soft	---	---	Moderate	Moderate.
Shinglemill	>60	---	---	---	High	High.
117:						
Cabrillo	>60	---	---	---	High	Moderate.
Heeser	>60	---	---	---	Moderate	Moderate.
118 Carlain	>60	---	---	---	High	Moderate.
119, 120:						
Casabonne	40-60	Hard	---	---	Moderate	Moderate.
Wohly	20-40	Soft	---	---	Moderate	Moderate.

Table 15.--Soil Features--Continued

Soil name and map symbol	Bedrock		Cemented pan		Risk of corrosion	
	Depth	Hardness	Depth	Hardness	Uncoated steel	Concrete
	In		In			
121:						
Casabonne	40-60	Hard	---	---	Moderate	Moderate.
Wohly	20-40	Soft	---	---	Moderate	Moderate.
Pardaloe	40-60	Hard	---	---	Moderate	Moderate.
122 Caspar	>60	---	---	---	High	High.
123:						
Caspar	>60	---	---	---	High	High.
Quinliven	>60	Soft	---	---	High	High.
124:						
Caspar	>60	---	---	---	High	High.
Quinliven	>60	Soft	---	---	High	High.
Ferncreek	>60	---	---	---	High	High.
125 Cleone	>60	---	---	---	High	High.
126. Coastal beaches						
127, 128 Cole	>60	---	---	---	High	Moderate.
129, 130:						
Comptche	>60	Hard	---	---	Moderate	Moderate.
Zeni	20-40	Soft	---	---	Moderate	Moderate.
131 Cottoneva	>60	---	---	---	Moderate	Moderate.
132 Crispin	20-40	Soft	---	---	Low	Moderate.
133:						
Dann	20-40	Hard	---	---	Moderate	Low.
Hiltabidel	10-20	Hard	---	---	Moderate	Low.
134:						
Dann	20-40	Hard	---	---	Moderate	Low.
Littlered	>60	---	---	---	Moderate	Moderate.
Hiltabidel	10-20	Hard	---	---	Moderate	Low.
135, 136:						
Dehaven	40-60	Hard	---	---	Moderate	Moderate.
Hotel	20-40	Hard	---	---	Moderate	Moderate.

Table 15.--Soil Features--Continued

Soil name and map symbol	Bedrock		Cemented pan		Risk of corrosion	
	Depth	Hardness	Depth	Hardness	Uncoated steel	Concrete
	In		In			
137:						
Dehaven	40-60	Hard	---	---	Moderate	Moderate.
Hotel	20-40	Hard	---	---	Moderate	Moderate.
Irmulco	60-80	Soft	---	---	High	High.
138. Duneland						
139. Dystropepts						
140 Feliz	>60	---	---	---	Moderate	Low.
141 Ferncreek	>60	---	---	---	High	High.
142, 143:						
Fishrock	10-20	Hard	---	---	High	High.
Iversen	20-40	Soft	---	---	High	High.
144, 145 Flumeville	>60	---	---	---	High	Moderate.
146:						
Garcia	20-40	Hard	---	---	Moderate	Moderate.
Snook	4-10	Hard	---	---	Moderate	Moderate.
Gube	20-40	Soft	---	---	High	High.
147:						
Gibney	>60	---	---	---	High	High.
Gibwell	>60	---	---	---	High	High.
148, 149 Gibwell	>60	---	---	---	High	High.
150, 151, 152 Glenblair	40-70	Hard	---	---	Moderate	Moderate.
153:						
Gschwend	>60	---	---	---	High	High.
Frenchman	>60	---	---	---	High	High.
154:						
Gube	20-40	Soft	---	---	High	High.
Garcia	20-40	Hard	---	---	Moderate	Moderate.
Snook	4-10	Hard	---	---	Moderate	Moderate.
155:						
Haploxeralfs.						
Argixerolls.						

Table 15.--Soil Features--Continued

Soil name and map symbol	Bedrock		Cemented pan		Risk of corrosion	
	Depth	Hardness	Depth	Hardness	Uncoated steel	Concrete
	In		In			
156:						
Haploxeralfs, wet.						
Argixerolls.						
157 Harecreek	>60	---	---	---	High	High.
158, 159 Havensneck	20-40	Soft	---	---	High	High.
160:						
Havensneck	20-40	Soft	---	---	High	High.
Seaside	5-10	Hard	---	---	High	High.
161 Heeser	>60	---	---	---	Moderate	Moderate.
162:						
Hiltabidel	10-20	Hard	---	---	Moderate	Low.
Dann	20-40	Hard	---	---	Moderate	Low.
163:						
Holohan	>60	---	---	---	High	High.
Hollowtree	20-40	Hard	---	---	Moderate	Moderate.
164, 165:						
Holohan	>60	---	---	---	High	High.
Hollowtree	20-40	Hard	---	---	Moderate	Moderate.
Casabonne	40-60	Hard	---	---	Moderate	Moderate.
166, 167 Hopland	20-40	Soft	---	---	Moderate	Moderate.
168:						
Hopland	20-40	Soft	---	---	Moderate	Moderate.
Squawrock	20-40	Hard	---	---	Moderate	Moderate.
169:						
Hopland	20-40	Soft	---	---	Moderate	Moderate.
Witherell	10-20	Hard	---	---	High	High.
Squawrock	20-40	Hard	---	---	Moderate	Moderate.
170, 171:						
Hopland	20-40	Soft	---	---	Moderate	Moderate.
Wohly	20-40	Soft	---	---	Moderate	Moderate.
172, 173, 174:						
Irmulco	60-80	Soft	---	---	High	High.
Tramway	20-40	Soft	---	---	Moderate	Moderate.
175, 176, 177 Iversen	20-40	Soft	---	---	High	High.

Table 15.--Soil Features--Continued

Soil name and map symbol	Bedrock		Cemented pan		Risk of corrosion	
	Depth	Hardness	Depth	Hardness	Uncoated steel	Concrete
	In		In			
178:						
Kibesillah	20-40	Hard	---	---	Moderate	Moderate.
Yellowhound	40-60	Hard	---	---	Moderate	Moderate.
179 Littlered	>60	---	---	---	Moderate	Moderate.
180, 181 Mackerricher	>60	---	---	---	Moderate	Moderate.
182, 183, 184 Mallopass	>60	---	---	---	Moderate	Moderate.
185:						
Maymen	10-20	Hard	---	---	High	High.
Etsel	4-14	Hard	---	---	Moderate	Moderate.
Snook	4-10	Hard	---	---	Moderate	Moderate.
186:						
Maymen	10-20	Hard	---	---	High	High.
Woodin	20-40	Hard	---	---	High	High.
Etsel	4-14	Hard	---	---	Moderate	Moderate.
187, 188, 189:						
Ornbaun	40-60	Soft	---	---	High	High.
Zeni	20-40	Soft	---	---	Moderate	Moderate.
190:						
Pardaloe	40-60	Hard	---	---	Moderate	Moderate.
Woodin	20-40	Hard	---	---	High	High.
191:						
Pardaloe	40-60	Hard	---	---	Moderate	Moderate.
Woodin	20-40	Hard	---	---	High	High.
Casabonne	40-60	Hard	---	---	Moderate	Moderate.
192 Perrygulch	>60	---	---	---	Moderate	High.
193, 194 Pinole	>60	---	---	---	Moderate	Moderate.
195:						
Pits.						
Dumps.						
196:						
Quinliven	>60	Soft	---	---	High	High.
Ferncreek	>60	---	---	---	High	High.
197. Riverwash						

Table 15.--Soil Features--Continued

Soil name and map symbol	Bedrock		Cemented pan		Risk of corrosion	
	Depth	Hardness	Depth	Hardness	Uncoated steel	Concrete
	In		In			
198:						
Seaside	5-10	Hard	---	---	High	High.
Rock outcrop.						
199:						
Shinglemill	>60	---	---	---	High	High.
Gibney	>60	---	---	---	High	High.
200:						
Shortyork	20-40	Hard	---	---	Moderate	Moderate.
Tyson	20-40	Hard	---	---	High	High.
Witherell	10-20	Hard	---	---	High	High.
201, 202, 203:						
Shortyork	20-40	Hard	---	---	Moderate	Moderate.
Yorkville	>60	---	---	---	High	Moderate.
Witherell	10-20	Hard	---	---	High	High.
204 Sirdrak	>60	---	---	---	Moderate	Moderate.
205, 206:						
Squawrock	20-40	Hard	---	---	Moderate	Moderate.
Garcia	20-40	Hard	---	---	Moderate	Moderate.
Witherell	10-20	Hard	---	---	High	High.
207, 208:						
Squawrock	20-40	Hard	---	---	Moderate	Moderate.
Witherell	10-20	Hard	---	---	High	High.
209 Stornetta	>60	---	---	---	High	Low.
210 Talmage	>60	---	---	---	Moderate	Moderate.
211:						
Threechop	40-60	Soft	---	---	High	High.
Ornbaun	40-60	Soft	---	---	High	High.
212, 213:						
Tregoning	>60	---	20-40	Thick	High	High.
Cleone	>60	---	---	---	High	High.
214. Tropaquepts						
215, 216:						
Tyson	20-40	Hard	---	---	High	High.
Updegraff	40-60	Hard	---	---	Moderate	Moderate.

Table 15.--Soil Features--Continued

Soil name and map symbol	Bedrock		Cemented pan		Risk of corrosion	
	Depth	Hardness	Depth	Hardness	Uncoated steel	Concrete
	In		In			
217 Updegraff	40-60	Hard	---	---	Moderate	Moderate.
218:						
Updegraff	40-60	Hard	---	---	Moderate	Moderate.
Hopland	20-40	Soft	---	---	Moderate	Moderate.
Woodin	20-40	Hard	---	---	High	High.
219. Urban land						
220:						
Usal	20-40	Hard	---	---	Moderate	Low.
Branscomb	40-60	Hard	---	---	Moderate	Moderate.
221 Vandamme	40-60	Soft	---	---	High	High.
222:						
Vandamme	40-60	Soft	---	---	High	High.
Caspar	>60	---	---	---	High	High.
223:						
Vandamme	40-60	Soft	---	---	High	High.
Irmulco	60-80	Soft	---	---	High	High.
224:						
Vandamme	40-60	Soft	---	---	High	High.
Irmulco	60-80	Soft	---	---	High	High.
Tramway	20-40	Soft	---	---	Moderate	Moderate.
225, 226, 227 Windyhollow	>60	---	---	---	High	Moderate.
228:						
Witherell	10-20	Hard	---	---	High	High.
Hopland	20-40	Soft	---	---	Moderate	Moderate.
Squawrock	20-40	Hard	---	---	Moderate	Moderate.
229, 230:						
Wolfey	10-20	Soft	---	---	Low	Low.
Bearwallow	20-40	Soft	---	---	Moderate	Moderate.
231, 232:						
Woodin	20-40	Hard	---	---	High	High.
Yellowhound	40-60	Hard	---	---	Moderate	Moderate.
233, 234:						
Xerochrepts.						
Haploxeralfs.						
Argixerolls.						

Table 15.--Soil Features--Continued

Soil name and map symbol	Bedrock		Cemented pan		Risk of corrosion	
	Depth	Hardness	Depth	Hardness	Uncoated steel	Concrete
	In		In			
235:						
Yellowhound	40-60	Hard	---	---	Moderate	Moderate.
Kibesillah	20-40	Hard	---	---	Moderate	Moderate.
236, 237:						
Yellowhound	40-60	Hard	---	---	Moderate	Moderate.
Kibesillah	20-40	Hard	---	---	Moderate	Moderate.
Ornbaun	40-60	Soft	---	---	High	High.
238:						
Yellowhound	40-60	Hard	---	---	Moderate	Moderate.
Woodin	20-40	Hard	---	---	High	High.
239, 240:						
Yellowhound	40-60	Hard	---	---	Moderate	Moderate.
Woodin	20-40	Hard	---	---	High	High.
Ornbaun	40-60	Soft	---	---	High	High.
241:						
Yorkville	>60	---	---	---	High	Moderate.
Hopland	20-40	Soft	---	---	Moderate	Moderate.
242, 243:						
Yorkville	>60	---	---	---	High	Moderate.
Squawrock	20-40	Hard	---	---	Moderate	Moderate.
Witherell	10-20	Hard	---	---	High	High.
244, 245:						
Yorkville	>60	---	---	---	High	Moderate.
Yorktree	40-60	Hard	---	---	Moderate	Moderate.
Squawrock	20-40	Hard	---	---	Moderate	Moderate.

Table 16.--Classification of the Soils

(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series)

Soil name	Family or higher taxonomic class
Abalobadiah	Fine-loamy, mixed, isomesic Pachic Argiustolls
Aborigine	Clayey, mixed, isomesic Typic Albaquults
Argixerolls	Argixerolls
Bearwallow	Fine-loamy, mixed, thermic Ultic Haploxeralfs
Biaggi	Fine-loamy, mixed, isomesic Ustic Humitropepts
Bigriver	Coarse-loamy, mixed, nonacid, isomesic Typic Tropofluvents
Blacklock	Sandy, mixed, isomesic, ortstein and shallow Typic Duraquods
Boontling	Fine-loamy, mixed, thermic Ultic Argixerolls
Branscomb	Loamy-skeletal, mixed, isomesic Ultic Hapludalfs
Bruhel	Fine-loamy, mixed, isomesic Pachic Argiustolls
Cabrillo	Fine-loamy, mixed, isomesic Ultic Haplustalfs
Carlain	Fine-loamy, mixed, isomesic Ultic Hapludalfs
Casabonne	Fine-loamy, mixed, mesic Ultic Haploxeralfs
*Caspar	Fine-loamy, mixed, isomesic Typic Haplohumults
Cleone	Coarse-loamy, mixed, isomesic Typic Hapludults
Cole	Fine, mixed, thermic Pachic Argixerolls
Comptche	Fine, oxidic, isomesic Pachic Argiustolls
Cottoneva	Coarse-loamy, mixed, nonacid, isomesic Typic Tropofluvents
Crispin	Fine-loamy, mixed, isomesic Ultic Haplustalfs
Dann	Clayey-skeletal, oxidic, mesic Typic Xerochrepts
Dehaven	Loamy-skeletal, mixed, isomesic Mollic Hapludalfs
Dystropepts	Dystropepts
Etsel	Loamy-skeletal, mixed, nonacid, mesic Lithic Xerorthents
*Feliz	Fine-loamy, mixed, thermic Cumulic Haploxerolls
Ferncreek	Clayey, mixed, isomesic Plinthic Haplohumults
Fishrock	Clayey, mixed, mesic Lithic Haploxerults
Flumeville	Fine, mixed, isomesic Typic Argiaquolls
Frenchman	Loamy-skeletal, mixed, isomesic Ustic Dystropepts
Garcia	Fine-loamy, mixed, mesic Ultic Argixerolls
Gibney	Clayey, mixed, isomesic Typic Hapludults
Gibwell	Clayey, mixed, isomesic Typic Hapludults
Glenblair	Fine-loamy, oxidic, isomesic Typic Argiudolls
Gschwend	Fine-loamy, mixed, isomesic Ustic Dystropepts
Gube	Clayey, mixed, mesic Typic Haploxerults
Haploxeralfs	Haploxeralfs
Harecreek	Coarse-loamy, mixed, isomesic Typic Haplohumults
Havensneck	Fine-loamy, mixed, isomesic Typic Haplustults
Heeser	Coarse-loamy, mixed, isomesic Ustic Humitropepts
Hiltabidel	Loamy-skeletal, oxidic, nonacid, mesic Lithic Xerorthents
Hollowtree	Loamy-skeletal, mixed, mesic Ultic Haploxeralfs
Holohan	Loamy-skeletal, mixed, mesic Ultic Haploxeralfs
Hopland	Fine-loamy, mixed, mesic Typic Haploxeralfs
Hotel	Loamy-skeletal, mixed, isomesic Ultic Hapludalfs
Irmulco	Fine-loamy, mixed, isomesic Ultic Hapludalfs
Iversen	Clayey, mixed, isomesic Typic Haplustults
Kibesillah	Loamy-skeletal, mixed, isomesic Ultic Haplustalfs
Littlered	Clayey, ferritic, mesic Xeric Haplohumults
Mackerricher	Sandy, mixed, isomesic Typic Humitropepts
Mallopass	Fine-loamy, mixed, isomesic Pachic Argiustolls
Maymen	Loamy, mixed, mesic Dystric Lithic Xerochrepts
Ornbaun	Fine-loamy, mixed, isomesic Ultic Haplustalfs
Pardaloe	Loamy-skeletal, mixed, mesic Typic Xerochrepts
Perrygulch	Fine, mixed, thermic Typic Endoaqualfs
Pinole	Fine-loamy, mixed, thermic Ultic Argixerolls
Quinliven	Clayey, mixed, isomesic Typic Haplohumults
Seaside	Loamy, mixed, acid, thermic Lithic Xerorthents
Shinglemill	Clayey, mixed, isomesic Aquic Hapludults
*Shortyork	Loamy-skeletal, mixed, thermic Ultic Haploxeralfs
Sirdrak	Sandy, mixed, isomesic Ustic Dystropepts
Snook	Loamy, mixed, nonacid, thermic Lithic Xerorthents

Table 16.--Classification of the Soils--Continued

Soil name	Family or higher taxonomic class
Squawrock	Loamy-skeletal, mixed, thermic Mollic Haploxeralfs
Stornetta	Fine-loamy, mixed, nonacid, isomesic Aquic Ustifluvents
*Talmage	Loamy-skeletal, mixed, thermic Fluventic Xerochrepts
Threechop	Clayey, mixed, isomesic Ustic Haplohumults
Tramway	Fine-loamy, mixed, isomesic Ultic Hapludalfs
Tregoning	Coarse-loamy, mixed, nonacid, isomesic Typic Tropaquepts
Tropaquepts	Tropaquepts
Tyson	Loamy-skeletal, mixed, mesic Typic Xerumbrepts
Updegraff	Fine-loamy, mixed, mesic Ultic Argixerolls
Usal	Fine-loamy, mixed, isomesic Typic Argiudolls
Vandamme	Clayey, mixed, isomesic Typic Haplohumults
Vizcaino	Loamy, mixed, isomesic, shallow Udic Argiustolls
Windyhollow	Fine-loamy, mixed, isomesic Udic Argiustolls
Witherell	Loamy, mixed, thermic Lithic Xerochrepts
Wohly	Fine-loamy, mixed, mesic Ultic Haploxeralfs
Wolfey	Loamy, mixed, thermic, shallow Typic Xerochrepts
Woodin	Loamy-skeletal, mixed, mesic Dystric Xerochrepts
Xerochrepts	Xerochrepts
Yellowhound	Loamy-skeletal, mixed, isomesic Ultic Haplustalfs
Yorktree	Fine, mixed, mesic Ultic Argixerolls
Yorkville	Fine, mixed, thermic Typic Argixerolls
Zeni	Fine-loamy, mixed, isomesic Ultic Haplustalfs

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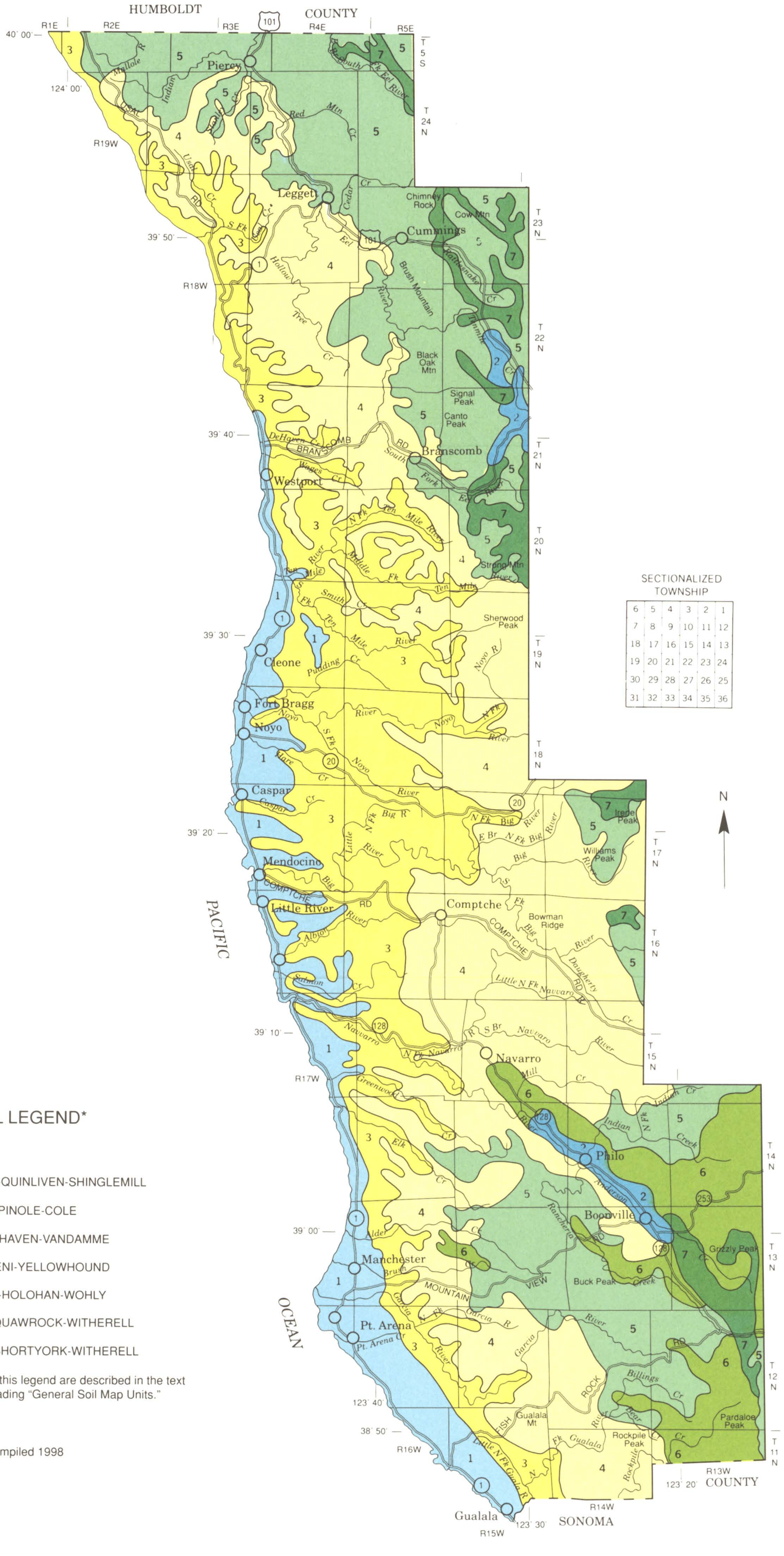

SOIL LEGEND*

1	FERNCREEK-QUINLIVEN-SHINGLEMILL
2	BOONTLING-PINOLE-COLE
3	IRMULCO-DEHAVEN-VANDAMME
4	ORNBAUN-ZENI-YELLOWHOUND
5	CASABONNE-HOLOHAN-WOHLY
6	HOPLAND-SQUAWROCK-WITHERELL
7	YORKVILLE-SHORTYORK-WITHERELL

* The units on this legend are described in the text under the heading "General Soil Map Units."

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UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
REGENTS OF THE UNIVERSITY OF CALIFORNIA
UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

GENERAL SOIL MAP

MENDOCINO COUNTY, CALIFORNIA, WESTERN PART

Scale 1:506,880

1 0 1 2 3 4 5 6 7 8 Miles

0 8 16 Km

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.